MANAGEMENT

PRINCIPLES • PRACTICES • PROBLEMS

HODGES

UNIVERSITY
OF FLORIDA
LIBRARIES

1853

Gift of

James G. Richardson

To James G. Richardson

with best wishes
from

Henry G. Hodges

Gainesville
5/21/56

MANAGEMENT

PRINCIPLES

PRACTICES

PROBLEMS

Management

Henry G. Hodges, Ph. D.

University of Florida

HOUGHTON
MIFFLIN
COMPANY • *Boston*
The Riverside Press Cambridge

University of Florida
1853

COPYRIGHT ©, 1956, BY HENRY G. HODGES
ALL RIGHTS RESERVED INCLUDING THE RIGHT TO
REPRODUCE THIS BOOK OR PARTS THEREOF IN ANY FORM

The Riverside Press
CAMBRIDGE • MASSACHUSETTS
PRINTED IN THE U.S.A.

To Margaret

Digitized by the Internet Archive
in 2014

https://archive.org/details/managementprinci00hodg

• Preface

This book is an introduction to the principles, practices and problems of the management of business concerns. "Business" here is taken in its broadest sense to embrace both the world of commerce and the world of manufacturing. There has been a tendency in the field to separate these two areas, and this distinction is reflected in many of the introductory textbooks, which deal with "business" *or* "industry" but not both. For several reasons, the present book attempts to get away from such a division of subject matter.

In the first place, the author has observed that students coming into the introductory course in business management are about evenly divided between those who are looking forward to careers in commercial enterprises and those who will go into some phase of manufacturing. This diversity of students would not be sufficient justification for combining these two phases of business in one book if to do so meant an artificial lumping together of two separate bodies of subject matter, either of which would be useful for only one half the class. But this is not the case. For although there are problems which are unique to manufacturing just as there are problems peculiar to the commercial field, all authorities will agree that there are also principles, practices and problems common to all kinds of business. It is the author's conviction that the student should begin his study of management in this common area.

Such an approach is not a compromise — an attempt to seek the lowest common denominator among a heterogeneous group of students. On the contrary, it is a recognition of the fact that there is much to be lost by the student who begins to specialize in the field of management too early. Techniques developed by one branch of business are continually being borrowed by others. Some of these borrowings are not well enough known. Students whose training has been restricted to the commercial aspects of business, for example, are likely to be unaware of the applicability of certain industrial practices to their own field of management. The present book notes such applications. Thus, in the chapter on Managerial Planning, it is shown how the routing, scheduling and dispatching procedures scientifically devised for manufacturing processes are widely applicable in such nonmanufacturing enterprises as warehousing, transportation, department stores and the service industries. Again, scientific techniques of material handling and quality control have each been given a chapter; traditionally, these two topics have been treated only in those textbooks devoted to the industrial phase of business management, and their significance outside industry has been too little recognized.

If ten years of teaching have brought the writer to the conclusions just stated, twenty-five years in the practicing world of management, both as an executive and a consultant, have led him to observe that there are certain topics, often passed over lightly in the textbooks, which are likely to be major problems to the student in his early days as a manager. To answer one such need, an entire chapter has been devoted to supervisors and foremen. College students who use this text will presumably never be foremen themselves. But because many of them will be entering the management hierarchy at a rank just above the supervisory level, it is particularly important that they understand the traditional strains in the foreman's role, the reasons for those strains, and the ways in which they can be relieved. Again, the chapter on Collective Bargaining gives the student a picture of what specific things should go into a labor–management contract; this important phase of personnel and labor relations has often been omitted altogether in introductory textbooks on management.

The general plan of the book is to present the basic problems and principles of management and organization in the early chapters, and then to show how these problems are — or ought to be — resolved in practice by application of the principles expounded. In this sense, the book is cumulative. However, to provide teaching flexibility, each chapter is complete in itself, and wherever any confusion about a term or an idea may arise, specific reference is made to the place in the book where that concept is most fully discussed.

All but the first two chapters end with a case problem for the students to work out by themselves. Fictitious names are provided, but most of the problems are descriptions of actual situations which the author has encountered in the business world. In all cases, the attempt has been made to gear the problem to the subject matter of the chapter in which it appears. A few of the problems — those which call for mathematical calculations — have a single correct answer. The majority, however, are not black and white situations; several solutions will occur to the student, and he must exercise careful judgment in selecting among alternatives. In other words, these are *problems,* not mere exercises. Exercises too often provide the student with nothing but pleasant fictions. The case problems presented here are certain to provoke thought and interested discussion; the majority of them have been used by the author in his own introductory course.

It would be dishonest to imply that the following pages are the result of an individual effort. Numerous sources are acknowledged in the footnotes. In addition, many colleagues interested in business and college teaching have contributed ideas and helpful criticisms, both consciously and unconsciously. Many years of such contacts make it impossible even to recall some of the unrecorded sources. Mr. Raymond Ziegler of the State College of Washington was helpful in simplifying the presentation of time-study data. At the University of Florida, the author received valued suggestions from Drs. John B. McFerrin, Frank Goodwin, Joseph S. Floyd, Jr., Clifton Oliver, Jr. and Victor V. Sweeney. Among those engaged in the various fields of management, Morris L. Cooke and Norman J. Greene of Philadelphia have made contributions from their long and varied experience. Mr. Josef Huber of Vienna submitted to lengthy discussion on European business methods and offered criticisms of American practices. Mr. George Stein of Dayton, Ohio, has also helped through past discussion of management practices. Finally, grateful acknowledgement is due to Mr. Joseph E. Cain, President of P.R. Mallory & Company, of Indianapolis, for reviewing his thorough system of controls.

Finally, both my wife and the editors at Houghton Mifflin have been exacting and helpful manuscript critics. Not being professionally acquainted with the field, they have been constantly on the alert for any unclarities in the exposition, and their suggestions have undoubtedly made this book more serviceable to the beginning student. Needless to say, the writer assumes responsibility for all of this book's shortcomings.

HENRY G. HODGES

Gainesville, Florida
November 1955

• Contents

1. Background of Modern Management 1

2. Modern Management 16

3. Management Problems 37

4. Management Principles 59

5. The Management Team: Top and Middle Management 80

6. The Management Team: The Foreman 96

7. Principles of Organization 113

8. Organization Techniques 136

9. Managerial Control 156

10. Financial Management 177

11. Budgetary Control 198

12. Location and Layout 216

13. Material Handling 238

14. Maintenance 262

15. Managerial Planning 281

16. Planning Controls: Routing, Scheduling, Dispatching 309

17. Methods and Time Study 326

18. Quality Control 344

19. Inventory Control 364

20. Personnel Management 382

21. Personnel Relations 407

22. Collective Bargaining 428

23. Health and Safety 446

24. Wage Factors in Labor Relations 466

25. Wage Plans 483

26. Job Evaluation 514

27. Service Ratings 532

28. Training 548

29. Procurement 567

30. Marketing 590

31. Office Management 615

32. Appraising a Department 635

33. Research and Development 651

34. Public Relations 668

Index 683

MANAGEMENT

CHAPTER 1

Background of Modern Management

Men, materials, machines, money, markets — the effective coordination of these five elements is the province of modern management. Ever since the Industrial Revolution, which opened up unlimited possibilities of expansion in production and distribution, the problem of bringing these five elements into a working relationship with one another has grown so enormously complicated that management has had to become a science as well as an art.

If management is thought of as the problem of directing human efforts to carry on productive activity, then it can be said that there have always been "managers" — the headman of a primitive agricultural community, the overseer of a slave gang on a Roman villa, the lord's steward on a medieval manor, and the master craftsman in his fourteenth-century workshop, to name but a few. Managers are not new, and some of the problems they have to solve today are as old as recorded history. But at no time in the past has the harmonious combination of the five elements been so difficult to achieve as it is in the modern era. There are two reasons for this.

In the first place, there have been periods prior to the Industrial Era when all five elements did not have to be taken into consideration by the "manager." The task of coordination seems to have been far easier in the feudal period than it was in the days of the Roman Empire, or at any time since, simply because two of the elements — money and markets — had become irrelevant to the medieval economy. Since trade had virtually disappeared from Western Europe, and almost everything that was produced on the manor was consumed there, marketing did not present a problem, and a few shillings and pennies were all the money anyone ever required.

In the second place, even at periods in the past when all five management factors had to be considered, each of them was simple enough to make the problem of coordinating it with the others less complicated than it is today. The master weaver of the later Middle Ages, for example, may have had to take care of his own marketing in a rapidly growing money economy, but he needed no advertising or sales department to dispose of his goods. Furthermore, the coordination of men, materials and machines called for no routing charts and flow diagrams, when his half dozen subordinates were all performing the same operation on the same kind of hand loom in his own house.

Not the least significant development for management has been in the first of the five elements — men. What society defines as just relations between one man and another has changed considerably since the dawn of history. The gang boss in ancient Egypt did not have to worry about psychological techniques for keeping the slaves happy while they dragged the massive blocks of stone that formed the Pyramids. Slave labor was based on compulsion. There was no shop steward and no grievance committee to communicate the slaves' complaints to "upper management." Free labor, bargaining collectively with its employers, sets problems for the manager which are much more complex than those he had to deal with in the days of slavery and serfdom.

The problems and techniques of management in an era of mass production and mass distribution in a democratic society form the subject matter of this book. This era was ushered in by the Industrial Revolution of eighteenth-century England. The present chapter attempts to give historical perspective to contemporary management problems by showing briefly how the progression from slavery to free labor has changed the manager's problem and by describing in some detail the techniques and social relations of production just prior to the English Industrial Revolution as well as the factors that brought about the change to the modern era.

From Slave Labor to Free Artisanry

Slave production

Slave labor formed the human and economic base of Egypt's pyramids, as indeed of the civilization which they represent. Grounded in a complete lack of equality between workers and employers, this system bound human labor to the lowest social and economic levels, while the ruling employer classes continually improved their economic standing. It was the surplus product from the labor of slaves, who were forced to live on the barest minimum, that enabled a relatively small group of masters to make large contributions to temples, monuments and such centers of learning as Athens and Alexandria. During the slave period the focused weight of massed labor compensated for the crudeness of primitive machines, hand tools and management techniques.

Even before the rise of group production with hand tools, the opportunity to purchase their freedom began to evolve for superior producers among the slaves. Slave labor has always been characterized by wastefulness and low productivity. Consequently, many slaves in ancient times were encouraged to buy their freedom by working harder and producing more. Others were promised freedom in return for faithful care of their masters' children until they were grown.

The decline of the Roman Empire in the early Christian era marked also the decline of slavery as an important source of labor. At this time, the population of the cities dwindled and there was a marked shift from an urban to a rural economy. Rome gradually lost control over her empire and chaos began to reign in the provinces. Especially in Western Europe, the population began to form in clusters around the large estates, called villas. Free peasants began to give up their small holdings and attach themselves to the owners of the villas, both for protection against marauders and for economic security in times of scarcity. Here was the model for the later institution of serfdom.

Serf production

Whereas slavery had bound human beings as chattels to other human beings, serfdom, or the "manorial system," bound the worker to the land he cultivated. Under this system, which had become the prevailing pattern of production relations in Europe by the twelfth century, the country was divided up into manors, held in theory by a king or prince or duke and held in practice by his vassals, the lords. The common people, or serfs, who worked the soil for their livelihood, were permitted to do so only in return for dues and labor services paid to the lord. The dues were a fixed quantity of natural products or of goods made by the serf — grain, poultry, eggs, meat, cloth. The labor services were of two kinds: day work, which was required a certain number of days each week, usually three; and boon work, which the lord could command at any time, in addition to the regular day work. In theory, at least, the serf never knew what he would be commanded to do next. And yet he was better off than the slave because it was his services that belonged to the lord and not his person. The manorial courts recognized him as a person with definite rights, although he could bring suit only against another serf, not against a free man. Although he was forbidden to leave the manor where he was born, he had a kind of compensating security, because if the ownership of the land changed hands, custom dictated that the serf could remain to till it.

The medieval manor was almost completely self-sufficient. Except for luxuries like spices and salt and pepper, it produced all its own food. It produced hides for tanning and wool for weaving. Every manor had its own wheelwright, carpenter and blacksmith. And, what was always annoying to the serfs, since they had to pay fees to the lord for the use of them, each manorial village had its own grain mill and bake-oven and, usually, its own wine press and brewhouse.

Artisan production

The manorial system reached its peak by the twelfth century and then went into decline. A new system of free labor gradually arose in its place. Serfs began to buy their freedom with "quit rents" — rents based on the value of their services rather than of the land — and set up small independent farms. Many of the newly freed peasants turned from the soil to handicrafts, especially spinning and weaving for England's growing wool industry, which was becoming important in the English economy. Many lords were converting their arable lands into pastures for sheep and, because sheep-tending required fewer men than agriculture, many peasants turned to the various crafts for a livelihood. This growing body of independent artisan wage earners gradually became a distinct minority group, subject to detailed regulation and control by the Church in matters of wages and the selling prices of their wares.

Craft Guilds. As production skills and professional trading became more widespread, the craftsmen naturally formed organizations for their mutual protection and benefit. Workers in the same trade tended to congregate in certain towns, some of which developed reputations for the product on which their artisans specialized. Many artisans adopted items of distinctive dress as a badge of their trades. These craft guilds spread into the new industrial towns of Italy, Germany, France and England.

Membership in the guilds was rigidly regulated. A man began as an apprentice, when he had learned the trade he became a journeyman, and after a waiting period he was entitled to set up a shop of his own as a master craftsman. Work was generally done in the home of a master, with whom it was customary for the apprentices to live. The master supplied the apprentice with the necessary tools and gave him a new set at the time he became a journeyman. Under such conditions the master's investment was relatively small and, since a frugal journeyman could set up as a master after a few years at his trade, there was — in the early days, at least — no marked social cleavage between the two upper groups.

The guilds regulated wages, hours of work, the number of apprentices, the sales territory and the selling prices of products. In addition, they became so strong politically in many towns that they virtually controlled the local governments. Many joined the guilds for the economic protection they afforded, just as the vassals pledged loyalty to landlords for physical protection during the medieval period. One of the reasons for the eventual downfall of the guilds was the fact that they used their economic and political monopolies for purely selfish purposes. But it was above all the advent of the machine which hastened the disintegration of guild influence. The economic structure of the guilds could not withstand the onslaught of the machine's bid for cheap semiskilled labor.

After a time selfishness began to split the guilds internally. From the beginning of the fifteenth century, a social cleavage gradually developed between the masters on the one hand and the journeymen and apprentices on the other. The masters set more and more restrictions on entrance into their group — difficult tasks to be accomplished and fees to be paid. The group of masters became ever smaller, taking on the character of owner-employers, while the skilled journeymen became more numerous, gradually forming a permanent wage class. This division gave rise to the secret societies of journeymen, sometimes known as "yeomanry guilds," organizations similar to the trade unions of the nineteenth century.

There appears to be a remnant of the original guild type of industrial control in Switzerland. "There is a lot of regulation of Swiss industry and commerce by the professional associations within each trade — as well as by government. In most industries new firms can't start up without a special permit from the association. And this is as true of the cheese industry as it is of the metal-working industries [including watches]. Retailers in Switzerland usually operate under market-sharing deals." [1]

The Rise of Trade. Originally, there seems to have been no distinction between merchant and craft guilds, the craftsmen acting as their own salesmen. But after the Crusades and especially after England began to produce enough wool for export, trading in its own right became important, and merchants began to accumulate large amounts of capital. The limited routes for trading were fraught with the struggles of the courageous tradesmen who sought advantageous exchanges for their products. They risked their investments and their lives on the unprotected land and sea routes. Bandits on the land and pirates on the seas vied with the elements to make the merchant trader's life a hard one. Trading was a business for only the stoutest of heart, but the rewards in profits were commensurate for those who succeeded. Under such conditions it was only natural that traders were frowned on as a low social caste by the general population.[2]

The great discoveries of the sixteenth century opened up new markets all over the world as well as new sources of raw materials, both of which the merchants were quick to exploit. The existence of this class of independently wealthy merchants, with ever larger amounts of money to invest, was a financial prerequisite to the Industrial Revolution.

From Home to Factory

Domestic handicraft production

Under manorialism, the craftsman had produced for his family and his manor. This phase of handicraft production is known as *domestic*.[3] With the revival of commerce and the growth of fairs at which craft products were sold, there arose among the new class of merchants the prototype of the business entrepreneur, who bought the raw materials himself and then turned them over to the artisans for processing. To facilitate this stage in the evolution of production, several artisans of the same skill would be brought together at one house or "cottage." Thus the "putting-out" of materials by traders for processing by the artisans under a single roof became known as *cottage* production. It was the cottage system that later expanded, as machines made possible an increase in the volume of production, into a full-fledged factory system.

---

[1] *Business Week*, No. 1178 (March 29, 1952), p. 194.

[2] "A tradesman thou! and hope to go to heaven?" — Persius, Satire V, 204 (Dryden translation). "To found a great empire for the sole purpose of raising up a people of customers may at first sight appear a project fit only for a nation of shopkeepers." — Adam Smith, *The Wealth of Nations* (Modern Library edition; New York: Random House, 1937), p. 579.

[3] Some students of economic history restrict the term "domestic" to a level of production in which goods are produced for the immediate family and in which there is little division of labor, except between men and women. The more advanced level of production of manorialism, in which each village had its own specialized craftsmen, is then referred to as "handicraft" production.

The putting-out plan still exists in many types of manufacturing. For example, a mattress factory may distribute tickings cut to size, together with the necessary thread and binding, to be sewed on power machines, which the factory installs in the homes of the sewers. Such putting-out of production occurs during rush periods and tends to be supplementary to the same type of work done at the factory. Modern subcontracting, about which we read so much during two world wars, is another outgrowth of the cottage system.

Factory production

The factory may be defined as *a building in which a group of workers carry on a production process.* The word is derived from the Latin verb *facere,* "to make." The records indicate that factories, according to this definition, existed in several European countries before the advent of the machine. As already suggested, factories evolved quite naturally out of the cottage system. It can be assumed that, even without machines, these early factories housed many more workers than the average "cottage." Suffice it to say that the factory was a recognized production unit before the machine forced its rapid growth in both size and numbers. Machine production would have started the factory system if it had not already existed.

The Industrial Revolution

Fundamentally, the Industrial Revolution refers to the change from an agricultural society with local markets to an industrial society with worldwide markets.[4] The rise of the machine–factory system and the development of the industrial economy in which it was nurtured were dependent on a number of interrelated factors, chief of which were: (1) the expanding use of machines, (2) basic new inventions and (3) the growth of world markets.

These factors, together with available water power and ready access to raw materials, made England the natural incubator of the Industrial Revolution in the eighteenth century. An island empire, all her towns were close to sea lanes leading to far-flung colonial possessions, from which she could

[4] The term "Industrial Revolution" was probably first used by Arnold Toynbee in a series of lectures delivered about 1880 and published as *Lectures on the Industrial Revolution in England.*

import raw materials free of restrictions. Plentiful water power gave her an early opportunity to relieve workers from the burden of having to operate machines by hand.

The revolution in England's textile industry

For more than a thousand years, developments in the techniques of textile manufacturing had been negligible. Suddenly, within a single generation, a series of basic inventions revolutionized the textile industry. What was there about England to stimulate this series of crucial inventions at just this particular time?

For one thing, the English Parliament had passed a law in the previous century which protected property rights in patents, thus assuring the inventor the rewards for his intellectual labor. Perhaps more important, the sudden burst of inventions went hand in hand with a new interest in the textile industry on the part of investors. The two phenomena acted on each other. Inventions spurred investments, and the expansion made possible by new capital created ever new demands for technical innovations.

Why were investors suddenly interested in textiles? The monopolistic industrial controls exercised by the craft guilds were under attack by investment capital. Savings had been accumulating and investors were seeking outlets for their money. Craft-union restrictions on apprentice training had severely limited the supply of skilled labor; and the enclosure movement in agriculture, spurred now by the beginnings of large-scale scientific farming, was sending more people off the land, where they had been able to produce all the necessities of life at home, into the cities, where they were dependent on the commodity market. Consequently, there was a perpetual shortage of consumer goods, which investors were eager to exploit.

Machine production offered potential investors a way not only of overcoming this shortage but, at the same time, of circumventing craft arrogance. The textile revolution did not start in the woolen industry, where guild controls were so well established, but in the relatively new cotton industry. Still another incentive for investment was the manufacture of textile machinery, where the possibilities for profit seemed unlimited.

Basic inventions

The manufacture of textiles breaks down into two main processes, spinning and weaving. The spinning process itself breaks down into two distinct phases: (a) drawing out the fiber from the mass of raw material and evening it, and (b) twisting it into yarn or thread. In ancient times, all of this was done by hand. The spinner would draw out the fiber with a stick, or "distaff," and then twirl the smoothed fiber on a smaller stick, or "spindle," which twisted the fiber into thread. Finally, the thread was woven into cloth on a hand loom. The Middle Ages saw the introduction of the spinning wheel, by which the spindle could be revolved mechanically. Otherwise, there were no significant mechanical innovations until the eighteenth century.

In the early eighteenth century, English weavers tended to be employed in "factory" groups, while the spinners worked at home under the cottage system. After John Kay's invention (1733) of the flying shuttle, which considerably accelerated the weaving process, the spinners were unable to produce sufficient yarn to permit continuous production by the weavers. This was the predicament that gave rise to the four important textile inventions of the last thirty years of the century.

1. The *spinning jenny* (1770) was invented by James Hargreaves in response to a prize offered by the London Society of Arts. The jenny, with eight spindles operating simultaneously, could produce yarn eight times faster than the old spinning wheel.

2. Now that the jenny had improved the twisting phase of the spinning process, a method was needed to speed up the first phase of drawing out and evening the fiber to be twisted. Between 1769 and 1775, Richard Arkwright developed the *roller spinning frame* to perform this function. This device, which drew out the fiber by means of rollers revolving on one another, was actually patented by John Wyatt and Lewis Paul in 1738, but Arkwright was the first to make use of it. The roller spinning frame was too cumbersome to be operated by hand, and Arkwright therefore installed it in various factories where it could be run by water power — hence the name "water frame" often given to it.

3. But Arkwright's frame was too crude and heavy to produce thread fine enough to compete with the delicate handspun cotton from India. And so in 1779, Samuel Crompton combined the operations of the frame with those of the spinning jenny to produce a new machine known as the *mule*. Now hand spinning could be eliminated altogether, with an enormous potential increase in production.

4. After these improvements in spinning had been applied to the textile industry, the pressure was now on the weavers to keep abreast of the yarn supply. The response to this new need came quickly, in 1785, with the invention of the *power loom* by Edmund Cartwright.

5. Overshadowing all these inventions in its significance for the future was the *steam engine,* the master stroke of the Industrial Revolution. It was invented in 1769 by James Watt, a Scottish engineer, in response to the needs of the coal-mining industry. If the Machine Age was to come into being, there must be iron to make the machines. Thus the coal industry became crucial. Before the eighteenth century, iron was smelted with charcoal fires, but toward the middle of the century, it was becoming clear that the great oak forests which supplied the charcoal would soon be exhausted. Basic inventions in the processing of coal produced a fire hot enough for the working of iron, but the big problem was that coal mines, as soon as they were dug to a certain depth, tended to flood, thus endangering the lives of the miners. In 1705, Newcomen produced a

clumsy coal-operated engine to pump water out of the mines. It was in the process of trying to repair one of Newcomen's pumps that Watt discovered the principle of the steam engine. Watt himself believed his discovery was applicable chiefly to the problems of pumping water and raising coal from the mines. But the steam engine's revolutionary possibilities soon made themselves known.

Effects of the Inventions. The spinning and weaving inventions had greatly increased production, but they would not have brought about the Industrial Revolution without the mechanical power supplied by the steam engine. There were disadvantages to the reliance on water power. In the first place, it tied the location of factories to places where water was available. Secondly, it was useless during summer droughts and winter freezes. Furthermore, water power and manpower were not necessarily abundant in the same places. But England had plenty of coal, fortunately situated near her best ports, so that Watt's steam engine allowed factories to spring up in a wide range of places.

It might be legitimate to ask just how revolutionary was the advent of machine production, since England had had factories as early as the sixteenth century, and prior to the eighteenth she had large investments in the hand-tool industry. Furthermore, a constant growth in the number of wage earners had been under way for centuries before the advent of the power machine. Why were the inventions, crowded into thirty years between 1770 and 1800, so revolutionary? It took many decades for these changes to be adopted widely in England and elsewhere. But when it was over, there had been a definite industrial revolution which produced fundamental social, economic and political changes. What was truly new about the inventions was that man had found ways of substituting for his own human power mechanical power that set no limits on the amount of goods that could be produced.

American contributions

The two outstanding American contributions to the early phase of the Industrial Revolution were made by Eli Whitney. His *cotton gin* (1792) was a considerable help to the English textile revolution. At the time the gin was invented, the daily output of seeded cotton was one pound per seeder. Whitney's new invention increased per capita output three hundred times. It not only reduced raw material costs to the textile trade, but it also led to increased planting of cotton.

Although Whitney is best known for the cotton gin, his chief contribution to industrial development was the idea of *interchangeability of parts.* By making all duplicates of various parts similar enough to be interchangeable, he paved the way for mass production. Interchangeability has two distinct and profitable advantages for industry. It makes possible a more extensive use of the division of labor in the production of parts, and permits the assembly method in the final stages of manufacture. In addition, it provides an incalculable saving of time and expense in repair work, which formerly required custom machining of the part to be replaced.

Since the interchanging of parts is possible only when machine tools are accurate enough to produce them within acceptable tolerances, Whitney's idea became profitable only as machine tools became dependable. The idea which he developed at Whitneyville, Connecticut, was first used in 1798, to the profit of both Whitney and the military, at the Springfield (Massachusetts) Arsenal on a government contract for firearms. With improving standards of machine-tool accuracy, interchangeability of parts has become the dominant characteristic of mass production.

Results of the Industrial Revolution

It is both interesting and important to know something of the background of modern industry in order to appreciate the reasons for some of the current difficulties in labor–management relations. From this standpoint, the results of the Industrial Revolution are probably more important than the events which led up to it.

The most important change from the point of view of production was the shift of skill from the workman and his tools to the machine. This shift had marked economic, social and political repercussions. *Economically,* it left many skilled artisans jobless. The new machines did the work better, faster and cheaper. In most cases, the only alternatives for skilled workers were to become machine operators at a much lower wage, or to learn to be a machinist or tool-maker — skills now in demand for building the machines required for the new production processes. For those skilled artisans nearing the end of their earning period, such alternatives were difficult and sometimes impossible. Either course was burdensome from the standpoint of the time required and costly because of decreased earning power during the learning period. As a consequence, many were forced out of employment permanently. For the unskilled, the new method offered unusual opportunities. They could increase their wages by learning one of the many new semiskilled machine operations. These forced changes were difficult enough in themselves; it was the relative suddenness with which they took place that stamped them with their revolutionary character. So disastrous was the new situation for the hand-skilled group that many of them sought relief through suicide.

This mixed and generally gloomy picture presents the more or less short-run economic consequences of the Industrial Revolution. We have noted that the highly skilled artisans of the old order suffered greatly, while the unskilled were offered opportunities as machine operators. The third consequence from the workers' standpoint was the rise of a new skilled group of machinists and tool-makers. These, as well as the machine operators, had to be trained to fit into the new industrial picture. It is clear that many workers suffered at this time, while others benefited, but when the transition period was over and the labor force had adjusted to the new requirements of machine production, the benefits came to outweigh the misfortunes. Better and cheaper goods demanded wider markets, creating many new jobs in the field of transportation and distribution. A large group of unskilled workers received higher pay as machine operators, thus creating additional buying power and consequent demand for more goods. The new era created a higher general living standard, which became more widespread as the marketing techniques of mass production were refined.

Another economic result of the Industrial Revolution was the greatly increased capital investment required to set up a manufacturing concern. The cost of the new machinery was prohibitive for most of the old master class, and their number dwindled proportionately. Increased capital requirements for doing business led to financial assistance from relatives and friends, or to partnerships, and finally to the corporate form, as manufacturing units grew larger and machinery more expensive.

As the cleavage between workers and employers became more pronounced, the two groups formed permanent economic and social classes. Those born into the employee group had little chance of becoming new leaders in industry. This new group consciousness laid the foundation for the conflict between capital and labor of the latter part of the nineteenth century. A real class struggle, born out of the feeling of worker helplessness, developed, with some gangster methods being used by both sides, as the literature of the period vividly demonstrates.

There were important *social* consequences, too. The movement of industry into ever larger factories promoted the rapid growth of cities, with all the attendant evils of crowding populations into small areas where facilities for healthful group living are woefully lacking. Before the Industrial Revolution, health was looked upon as a private matter. The idea of public health programs came very slowly — long after the congestion of industrial workers in the new cities had reached the point of a public scandal.

In the newly crowded cities, the incidence of contagious disease increased out of proportion to the increase in population, and crimes against property reached a new high. Public expenditures for hospitals and jails increased correspondingly. The expanding cities were forced to develop new services to cope with these and other problems, and the new services meant an increase per capita in taxes along with a general rise in the cost of living.[5]

Demand for the new machine-produced goods so exceeded the supply that long hours — for women and children, as well as for men — were the general rule. Workers posed little opposition to the twelve-hour day because the low pay scale made long hours necessary in order to meet living expenses. The new employer class also favored it, for obvious reasons. Factory working conditions received practically no attention for the simple reason that the labor supply was adequate under the new machine method of production. There was no need to make factories especially attractive to workers who had to have their jobs.

---

[5] The popular belief that the per capita cost of operating cities decreases with the growth of population is erroneous. Studies comparing city growth with operating costs prove the opposite. See Henry G. Hodges, *City Management* (New York: Appleton-Century-Crofts, Inc., 1939), pp. 11–12.

These were the days of the confessedly self-made, mass-producing pioneer. He was urged on by the desire for a new type of personal power and the promise of large profits, and he was unhampered by restraining legislation, either industrial or labor. These new "masters" of production were strictly a product of their time. The public generally considered their characters and exploits admirable and even enviable. They were the industrial Horatio Algers of the latter half of the nineteenth century. The debt that our long-term economic and social evolution owes to them is debatable. Without doubt, they laid the mass-production foundation on which a half century of improving living standards has been built. Without doubt, too, their methods, if practiced today, would run so far foul of current social and legislative standards as to land them in jail.

The excesses of the leaders during this industrial jungle period solidified individual rancors among the workers, and these rancors were later carried over into organized labor, which exploited such behavior as a justifiable reason to go and do likewise. It should be noted, also, that as labor has been given an ever stronger arm by expanded membership and favorable legislation, it has too frequently exhibited an unnecessarily selfish and ruthless attitude toward the unorganized majority — the public. These sweeping observations of the first hundred and fifty years of "post-revolutionary" industry lead to the conclusion that men are often influenced by group selfishness irrespective of which side of the industrial fence they occupy, and that as groups they may be counted on for a long time to come to take whatever advantage of superior power an apathetic citizenry allows. The alternative of a decent equilibrium between the forces of organized labor and the new management, and a clear conception of their mutual interests, rights and obligations will be better for both groups, as well as for the general public which feathers both their nests.

The *political* consequences of the Industrial Revolution have been equally pronounced and are still evolving. Organized labor has used an expanding franchise to produce a political power not enjoyed by industrial workers since the heyday of the craft guilds. The fact that the selfish abuse of their power was a dominant factor in the downfall of the guilds should serve as a warning to present-day groups similarly inclined.

In the earlier days of the Industrial Revolution in the United States, the labor groups toyed with the idea of gaining their objectives through labor-controlled political parties. Those plans failed to accomplish any long-run gains. Samuel Gompers led the opposition to this movement by forming the AFL to free labor from political party leadership. The Gompers philosophy was to support that political party which promised to further labor's program. However, experience has proved that "the labor vote" is not such a dependable political weapon as Gompers believed, because both political parties have tended to make similar promises in return for labor's support at the ballot box, and in the same manner, labor promises votes to both parties.

Irrespective of the ups and downs of its actual political power, labor has come to be recognized as a real potential by the politicians. It is a strong pressure group aimed at serving its own special interests. The Industrial Revolution produced the political climate which fostered this powerful pressure group.

The Second Revolution

Although this introduction deals with the background of modern industry, it would indeed be a timid soul who failed to point out those rumblings on the industrial horizon which portend a second revolution. Both in production and in clerical work, electronics and nuclear fission promise revolutionary changes greater than those produced by the machine and steam one hundred and fifty years ago. Just as steam freed machines from having to be located at available water power, so nuclear fission may free factories from having to be located within the distributive radius of coal or electric power. As the machine supplanted the skill of the worker, so may electronics supplant the machine operator. And just as the manufacturer during the First Industrial Revolution took over the palm from the trader and the financier, so may the engineer and the physicist take over the palm from the manufacturer.

Numerous experiments being conducted in the field of solar energy suggest the future substitution of direct energy from the sun for its earth-stored forms in coal, oil and gas. Its use for heat and power may well prove cheaper than nuclear fission. Dr. James B. Conant, former president of Harvard and one of the world's great scientists, is quoted as believing that technology might by-pass an age of atomic energy and go directly to an era of solar energy. Charles F. Kettering is now building a laboratory on the campus of Antioch College to carry on his experiments with solar energy. Not only the power potentials of the sun's rays, but its promise of comfortable working and living quarters through controlled heating and cooling staggers the imagination.

Marvin J. Kelly, executive vice-president of the Bell Telephone Laboratories, suggests that "it isn't unreasonable to look forward to the reality of a completely mechanized, robot assembly line. . . . And electronic devices — as control mechanisms, as thinking machines, and as measuring machines — are going to be the absolute heart of increasing mechanization and automatization of production."[6]

---

[6] From the discussion article, "How We Can Boost Productivity," *Factory Management and Maintenance*, Volume 108 (October 1950), p. 73. The April 1952 issue of this magazine consists of two volumes entitled "The Factory of the Future." One volume deals with equipment, processes and management, the other with plant design, materials and services.

Automatic electronic control of the production and inspection processes promises the elimination of so much human effort that one wonders whether the economic, social and political changes of the future may not dwarf those which steam and the machine started at the end of the eighteenth century. What effect will these "thinking" machines have on the jobs of millions of workers in industry?

Another promise of this new era is the approaching possibility of extracting salt from sea water, making it useful for both domestic and irrigation purposes. Mere cursory study of the progress of erosion and the lowering of the sweetwater table in large parts of this country will give point to the economic and social significance of ocean waters as a new source of supply. Whether the increased fertility following such irrigation will bring about a decline in the agricultural demand for labor, and to what extent, will be one of the typical problems that have always accompanied significant improvements in production and agriculture.

A clerical revolution is also being considered in light of the more recent electronic developments. This new principle can now be applied in the construction of an office machine for making out bills, keeping inventories and performing all sorts of statistical office calculations useful in procurement, stores-keeping and distribution. What promise has the further technical refinement of these new office machines for the jobs of the eight million persons now employed in clerical tasks?

These few possibilities for ushering in a Second Industrial Revolution are actually no more startling than some of the inventions which have become commonplace in the past twenty-five years. It behooves not only industry, but society in general to consider the industrial future in association with its social and economic possibilities. Those who can see and plan ahead will be able to alleviate some of the distresses caused by the rough edges of change.

Will this contemplated economic and social order be cause for rejoicing or lamentation? The answer is: "Probably, plenty of both." There is almost universal agreement that the past few decades have produced economic changes much faster than our social concepts and equipment could adjust to them. The leading economic group — the manufacturers — have been primarily interested in increased productivity, lower costs and higher profits. As a group, they have not been sufficiently interested in creating an equilibrium for a social structure constantly being disrupted by economic and technological advances. The predicted upheavals of the future, if they come, will be the products of engineering and some restricted fields of science. If the leaders in those fields understand the processes of change for which they are responsible, will they be capable of guiding the social and economic adjustments which their new powers and robots have made advisable?

When the automatic production of robot machines combines with the increasing human longevity brought about by the advances in public and industrial health standards, the resulting unemployment may well become society's major problem. Assuming that production will be adequate for all, and that some form of distribution has been "engineered" to satisfy human needs, what provision will be made for the new leisure of a still shorter work day? If the engineer-leader allows these problems to be shifted to the politician, as the industry-leader has done in the past, will the new situation promise hope or disaster? It seems possible that the industrial changes of the future may pose greater social and economic problems than those which resulted from the First Industrial Revolution.

Finally, what should be done to fit young college graduates for the responsibilities and opportunities that are already beginning to appear in faint outline on the industrial horizon? To what extent will these problems be intensified by the fact that most people are not even aware of a possible new industrial age, much less of its consequences? How much time will be required to train young people to handle the economic and social problems of a second revolution? A more difficult question is: how much time do we have? Whatever shape these approaching problems may take, it will be the common responsibility of management, government and society at large to find solutions for them.

QUESTIONS

1. What are the five elements that must be coordinated by modern management? Why were they easier to coordinate in the medieval period than they are today?
2. What was required of the medieval serf in return for the use of the land?
3. In the later Middle Ages, how was production organized on the manor? in the towns?
4. Give at least two reasons for the decline of the craft guilds.
5. What role did the merchants play in the cottage-production system?
6. Give present-day examples of both the guild system and the cottage system.
7. What would you say was "revolutionary" about the Industrial Revolution?
8. Why do you think the Industrial Revolution started in England? in the textile industry?
9. "Necessity is the mother of invention." What necessities gave birth to the spinning jenny? the roller spinning frame? the power loom? the steam engine?
10. What were Eli Whitney's two contributions to the Industrial Revolution?
11. How did the Industrial Revolution affect skilled workers?
12. What new group of skilled workers did the Industrial Revolution produce?
13. What were the chief social consequences of the Industrial Revolution?
14. How did the Industrial Revolution affect labor as a political force?
15. What is the evidence that a "Second Industrial Revolution" may occur?

CHAPTER 2

Modern Management

Just as the advent of the machine determined the trend toward ever increasing mass production, so did the new production process demand a kind of management different from that of the master–journeyman relationship which existed before the Industrial Revolution. Not only did mass production draw together large numbers of workers in factories; it also greatly expanded commerce and trading.

It was natural that the new management should first apply itself to improving the production processes. The necessity for a balance between production and distribution, however, soon forced an extension of the developing techniques of management to all forms and aspects of business enterprise. Since new management requirements were recognized only after the pressures of mass production gave rise to new problems, the development of management principles was a slower process than the technical developments of the machine. In other words, production techniques progressed in advance of the recognition of the principles which lay behind them.

The resulting high cost of poor management was absorbed in the new low cost of machine production. Consumer demand for the cheaper machine-made merchandise, higher wages for the new machine operator and machinist groups, extended markets — all combined to make the failure to apply management principles at the beginning of the industrial period relatively unimportant.

Three methods of modern management

As production gradually began to catch up with its markets, competition among producers and distributors started to restrict the profit prizes to those whose improved management produced superior results. It is customary to speak of three fundamental phases in the development of modern management. The three represent distinct methods of management, although they often blend in practice, particularly during a transition from one phase to another. The three methods, known as *rule-of-thumb, systematic* and *scientific,* represent an upward progression. Historically, one method was not completely eliminated by its successor: examples of all three exist at the present time, the prevalence of the lowest order, or rule-of-thumb method, being continually attested to in credit and bankruptcy reports.

Rule-of-thumb is the method used by managers who operate on a more or less inspired level. Their decisions are based largely on hunches. They have few principles for their guidance and are thus forced to make snap judgments without the aid of factual analysis. The rule-of-thumb method of management was a natural consequence of new industrial horizons and rapid changes. Our early business leaders employed this method simply because nothing better had been developed. These pioneers were referred to as "self made" — a term which applies equally well to themselves and to their management methods. Their representatives still exist, but since modern competition has made it difficult for them to operate profitably, they undergo a high turnover in today's business.

The only restraints under which the business pioneer operated were those set by the limits of his own imagination and ability. The demand for his products was insatiable; to produce more was his major problem. Statutory restrictions and governmental controls were something for the future. Many of his practices would lead to heavy fines, or worse, under current legislation. In competition with his peers he practiced methods now condemned as against public policy. In his heyday, those practices were accepted by the public generally — especially when they succeeded.

The pioneer was essentially a product of his time and conditions. He was financially successful and usually a respected leader of men, as well as a promoter of his community's and country's welfare. Today he would be publicly condemned for his methods and would be in frustrated rebellion against state and national business controls. He would probably be a business failure. We must not forget, however, that his public demanded no social responsibility of its leaders. His times made the business pioneer, and he shaped the age, without compunction, to his own liking.

Shortly after the middle of the nineteenth century there developed a *systematic* approach to the management of business. This trend introduced planned procedures to management, chiefly in the areas of production and record-keeping. The word "procedures" is used here in a technical sense. A few words are in order about methods, procedures and systems, because these are still important concepts in business and industry — the enduring contribution of the systematic management phase.

A *method* may be defined as an established way of doing something. Methods may become established, or standardized, through sheer habit or custom, or they may be set up after long and careful planning.[1]

---

[1] Richard F. Neuschel has pointed out that there is no consensus today on the definition of "methods," "procedures," and "systems." Sometimes the words are used interchangeably, at other times rigorous distinctions are made among them. See *Streamlining*

A *procedure* is an established sequence of methods and operations, usually involving several people in one or more departments of a concern. Whereas methods specify only *how* the single operation is to be performed, procedures lay down rules for the order in which operations will be performed and tell who will perform them, at what time and in what place. Like methods, procedures come into being either through custom or through deliberate planning.

A *system*, in the present context, is a network of related procedures. The essence of the systematic management movement was its creation of such systems, or networks, of planned procedures. In the early days, these systems were based on past performance. The manager asked himself what practices seemed to have given him the best results in the past, and these practices were then frozen into a routine. The great advantage of this approach over rule-of-thumb management was that the busy manager was no longer called upon to make decisions about all the minor problems that arose in the normal course of operations. With standardized procedures providing answers to all the recurring questions, the manager could devote his time to the exceptional problems.

The establishment of systems, with their standardized procedures and methods, was a necessary step in the development of the third, or *scientific*, phase of management. The notion of system is essential to all scientific analysis. The scientist approaches his subject matter by defining as precisely as he can all the constant and variable elements that he thinks are going to be important and then he tries to discover how all these elements are systematically related to one another. Thus, as a science grows, the scientist will be able to make the kind of predictive statement: A is systematically related to B in such a way that we can say with assurance that a given change in A will produce specified changes in B. In a highly developed science like physics, precise mathematical formulas for such relationships can be given.

To understand what it is that scientific management has added to the systematic approach, let us take an example of pure scientific method from the work of Frederick W. Taylor, who has often been called the "Father of Scientific Management." In his presidential address to the American Society of Mechanical Engineers in 1906, "On the Art of Cutting Metals,"[2] Taylor summed up the work of twenty-six years spent in trying to find an exact solution to three questions which must be answered every day in a machine shop by each machinist who is running a metal-cutting machine,

---

Business Procedures (New York: McGraw-Hill Book Company, Inc., 1950), pp. 9–10. The definitions offered here are very similar to Neuschel's. At the same time, the reader should be aware that not all authorities on management would use the terms in just this way.

[2] The references here are to the nontechnical introduction to this paper, in which Taylor sets forth the problems and the methods used in solving them. This introduction appears in C. B. Thompson, *Scientific Management* (Cambridge, Mass.: Harvard University Press, 1914), pp. 242–269.

such as a lathe, planer, drill press or milling machine: (1) what tool should be used? (2) what cutting speed should be used? and (3) what feed should be used? In the cutting of metals, the chips tend to pile up rapidly and interfere with the work; furthermore, the cutting tools themselves are very quickly worn out and have to be remade. The ideal solution to Taylor's three questions, for each particular job, would be that solution which minimized the disruptive effects of factors like the wearing down of tools and the piling up of chips. Taylor observed that under the old style of management, the answers to these questions were left up to the individual machinists, who felt that their own experience equipped them to reach the right solution to each new problem. The facts were otherwise, and Taylor could see that there was a great deal of wastefulness under these hit-or-miss methods.

After long study, Taylor discovered that there was a minimum of twelve variables which had to be taken into account simultaneously in every case in order to give the one best answer to each of the three questions. Experiments were then begun to find out how all twelve variables were systematically related to one another. After many false starts, Taylor found that the best measure of the value of a tool lay in the exact cutting speed at which it was completely ruined at the end of twenty minutes. Using this as the criterion situation by which to judge the effect of the twelve interacting variables (for example, the quality of the metal to be cut, the depth of the cut, the chemical composition of the steel from which the tool is made), Taylor used the method of the controlled experiment, in which "an attempt is made to hold all of the elements constant and uniform, except the one variable which is under investigation, and this one is systematically changed and its effect upon the problem carefully noted." [3]

By the time these experiments were over, Taylor and his associates were able to assign numerical values to each of the twelve variables and set up mathematical formulas to describe the systematic relationships among them. A slide rule was then constructed which could answer the three questions — what tool, what speed and what feed — automatically, and with a precision that the most highly skilled machinist could never attain from experience alone.

The method of management that we are referring to here as *systematic,* and which followed historically the rule-of-thumb method, is systematic only insofar as it tries to reduce a set of practices that have proved successful in the past to a system, or routine, for dealing with problems that tend to recur. This approach cannot be called *scientific* because it does not try to break down each problem situation into its constituent elements or variables to study the interrelationships among them and, further, because it does not look behind a given set of practices and discover what *laws* and *principles* are operating in the situation to bring about the desired result.[4] The systematic approach asks the question: *what* practices have worked out in the past? The scientific approach asks: *why* is it that certain kinds of practices have worked out in the past and why have others failed? Systematic management is essentially a mechanism; scientific management is a method.

---

[3] Taylor, *loc. cit.*, p. 253.

The application of system to management is always an important step forward over the rule-of-thumb approach, but it does not provide for controls, which measure results against standards. The seriousness of this omission will be seen in Chapter 9 on Managerial Control. Furthermore, the practices adopted under the systematic approach have a tendency to become frozen into a static routine, allowing too little opportunity for progress in the techniques of management.

Scientific management, on the other hand, is equipped to deal with phenomena that are essentially dynamic. Its problem-solving is based on objective and scientific foundations. The scientific method is demanded in businesses where procedures have become so complex as to separate the line (directing) function from the staff (problem analysis and planning) function. Under scientific management, answers to problems requiring new methods and procedures are no longer based on the leader's positional authority or his inspired decisions, but rather come from established principles and the analyses of specialists in the various fields into which modern management has evolved. It is with the study of the scientific phase of management that this text is chiefly concerned.

Management literature

The comparatively recent growth of literature in the field of management is an unmistakable indication of its newness in a professional sense. One writer made a list of the various books on organization and management referred to in a 1948 text on the subject. There were 82 such books in all. Of these, none was published prior to 1911; only 2 were published before 1921; and 66 of them — or nearly 80 per cent — were published after 1931.[5] After 1930, published literature in this field grew apace. The 1947 edition of the *Bibliography of Industrial Engineering and Management Literature*[6] included references to twelve hundred books and articles in the field of management, besides an index to over three thousand articles on motion and time study and related subjects. Whereas the literature probably lagged behind management accomplishments prior to 1930, the opposite situation has gradually developed since that date. The amount of recent literature on management techniques has far outstripped the time and ability of management men to take advantage of them. For the most part, application of these newer techniques has been in the hands of specialists in management consulting.

---

[4] The formulation of laws and principles has been one of the major concerns of scientific management. A full discussion of this aspect of management, together with a presentation of some of the most important general principles, is found in Chapter 4.

[5] Thomas H. Nelson, "The Credit Executive's Place in Management," *Credit and Financial Management*, Vol. 51 (July 1949), p. 7.

[6] By Ralph M. Barnes and Norma A. Englert (Dubuque, Iowa: W. C. Brown Co., 1946).

Fundamental Definitions

In the rapid development of the machine age, words themselves seem to have grown up in the same arbitrary way as the methods of the rule-of-thumb managers. Take the word "manufacture." Prior to the advent of the machine, hand-made goods were referred to as custom-made. They were made on order. When it became necessary later on to distinguish between custom-made and machine-made, the English started to use the word "manufactured" for machine-made merchandise. But this anglicized Latin derivative was patently born in the confusion of the Industrial Revolution. Actually, it is compounded from the Latin *manu,* meaning "by hand," and *factus,* which means "made." Thus we have the contradiction of describing machine-made goods as being "made by hand."

Definitions are necessary for common understanding in any scientific field. In management they are more than commonly important because of the lack of general agreement about the meaning of some of our fundamental terms. The field of management would be well served if there were some recognized authority who could establish official definitions.

The distinction, or lack of it, between "management" and "administration" is an example. Among some writers in the field of management there is a tendency to blend, if not to make synonymous, the concepts of administration and management. There should be a definite distinction. Majority opinion holds that administration determines general policies, while management sees that they are carried out. The confusion evidently arises from the fact that the various layers of management often *influence* policy-making. It is on this basis that management is occasionally credited with *making* policies, a conclusion which unnecessarily blurs the distinction between the two ideas.[7]

Management

Some authors quite justifiably seek to describe management rather than define it. The objection to this practice is that several pages of explanatory description tend to throw a haze about a word which can be defined satisfactorily. Let us take a few definitions at random and see what they have in common.

The ASME (American Society of Mechanical Engineers) calls management "the art and science of preparing, organizing and directing human effort applied to control the forces and utilize the materials of nature for the benefit of man."[8] Oliver Sheldon's definition is much quoted: "Management proper is the function in industry concerned in the execution of policy, within the limits set up by the administration, and the employment of the organization for the particular objects set before it."[9] A more recent definition is Thomas H. Nelson's: "Management in business is the science and art of combining ideas, facilities, processes, materials, and people to produce and market a worthy product or service profitably."[10] Petersen and Plowman define management in general as "a technique by means of which the purposes and objectives of a particular human group are determined, clarified, and effectuated."[11]

---

[7] The same confusion between managing and policy-making apparently exists in the German language, where *Direktion* means "management," *Direktor* means "manager," and *Direktorium* means "board of directors."

These are only four out of an indefinitely large number of definitions that might have been cited, but there is no reason to believe that they are not typical of the literature as a whole. Superficially, there appears to be a lot of disagreement among them. For example, Nelson and the ASME agree on calling management "a science and an art," where Sheldon refers to it as a "function" and Petersen and Plowman as a "technique." Perhaps a more important disagreement is the question of *what* it is exactly that is *being managed.* The ASME says "human effort," Sheldon says "the organization," Petersen and Plowman say "a particular human group" and Nelson, in more detail, says, "ideas, facilities, processes, materials and people." The differentiating factor here is whether or not things should be included with people as the objects of management. The ASME sees management as the application of human effort to things; Sheldon, though he does not mention material things in his definition of management, does include them in his definition of organization[12]; Nelson includes them specifically; but Petersen and Plowman restrict management to the direction of people and, similarly, they see organization as a structure of people. Henri Fayol also confines management to human relations,[13] but includes material factors as an essential part of his definition of organization.

Still another way in which these definitions differ is in their *generality.* Sheldon's is restricted to industry, Nelson's to business. The ASME does not confine management to any particular kind of enterprise, although it does make the rather optimistic assumption that management is always for the benefit of man. Petersen and Plowman make their definition broad enough to include any kind of organization — economic, military, political or even social.

Finally, the *goals* of the managerial process are all stated differently:

[8] Cited in L. P. Alford and J. R. Bangs, *Production Handbook* (New York: Ronald Press Company, 1948), p. 4.

[9] *The Philosophy of Management* (New York: Prentice-Hall, Inc., 1923), p. 32.

[10] *Loc. cit.*, p. 4.

[11] Elmore Petersen and E. Grosvenor Plowman, *Business Organization and Management* (3d ed.; Homewood, Ill.: Richard D. Irwin, Inc., 1953), p. 33.

[12] See p. 114, footnote 2.

[13] *General and Industrial Management,* trans. Constance Storrs (London: Sir Isaac Pitman & Sons, 1949), p. 19.

"to control the forces and utilize the materials of nature for the benefit of man"; "the employment of the organization for the particular objects set before it"; "to produce and market a worthy product or service profitably"; "to determine, clarify and effectuate the objectives of a particular human group." Despite this diversity in the statement of goals, it is important to point out that all of these writers agree that orientation to goals, whatever they may be, is an integral part of the definition of management.

For the purposes of this book, let us say that *management is the accomplishment of objectives through the use of men, materials and machines.* This definition seems to us to have the virtues of simplicity and generality. It might be argued that the inclusion of machines seriously narrows the applicability of the definition. And yet it is difficult, in our day, to think of any enterprise, economic or otherwise, where the use of machines — from the office typewriter to the fully automatic plant — is not a factor to be taken into consideration by the manager.

It was pointed out that Nelson and the ASME both refer to management as "a science and an art." The distinction is a useful one. It may well be said that the techniques involved in the managerial process make up the *science* of management, whereas the task of obtaining the cooperation of employees in accepting and actively using those techniques is the *art* of management. Certainly one can say that these "scientific" and "artistic" attributes are rarely found in the same leader! [14]

Management as Defined by Specific Functions. It may be remembered that, in Chapter 1, management was loosely defined as the coordination of men, materials, machines, money and markets. This definition has much to recommend it, but the difficulty with calling management the *coordinator* of activities is that coordination is merely one of the important functions of management. Besides coordinating, management must plan, organize, direct and control. Indeed, this is the way in which the most famous of French authorities on the subject, Henri Fayol, defines management: "To manage is to forecast and plan, to organize, to command, to coordinate and to control." [15] An immediate difficulty . . . of course, is that each of these five functions has to be defined. Fayol does so briefly:

> To foresee and provide means examining the future and drawing up the plan of action. To organize means building up the dual structure, material and human, of the undertaking. To command means maintaining activity among the personnel. To coordinate means binding together, unifying and harmonizing all activity and effort. To control means seeing that everything occurs in conformity with established rule and expressed command.[16]

---

[14] It should be borne in mind that in recent years the sciences of industrial psychology and industrial sociology have made rapid strides in defining the conditions under which employees will be likely to cooperate with management to the fullest extent. However, progress in this area is slow, and the generation of students who will use this book need not worry that science will eliminate the need for the personal *art* of managing in their day.

[15] *Op. cit.*, pp. 5–6.

[16] *Ibid.*, p. 6.

This way of breaking down the management process into five distinct functions, or phases in a cycle, has come into wide use by writers on management. The scheme will be used in this book as a convenient operational definition of management. A fuller discussion of these five functions will be postponed until Chapter 5.

It goes without saying that the word management is frequently used in this book to refer not to the process of managing but to the actual persons who do the managing.

Administration

Over-all policy-making is the chief concern of the administrative function, and in the corporate form it is the prerogative of the board of directors. General control of management is another prime duty of administration. The chief purpose of general control is to coordinate such activities as finance, production and sales so that they tie in with the general policies of the organization. Without such top policy control, the activities of management may work at cross-purposes and so defeat company objectives. Policies determined and clearly expressed by administration serve as an aid to top management in formulating the programs for their accomplishment.

Organization

Although organization has been listed above as one of the five functions of management, in one sense it is a more basic concept than management. "Organization is the form of every human association for the attainment of a common purpose."[17] We shall use the word in a more restricted sense to refer to the process of building up the structure of an enterprise which will provide for the separation of activities to be performed and for the arrangement of these activities in a framework which indicates their hierarchical importance and functional association. This definition will be elaborated in Chapter 7 on Principles of Organization.

The operating relationship among organization, administration and management may be expressed briefly as follows: *management carries out the policies of administration through the framework of organization.* There are many other terms in the field of management which must be used in a technical sense, but the three considered here are fundamental.

Pioneers in Scientific Management

Frederick W. Taylor (1856–1915), as we have mentioned, is universally referred to as the "Father of Scientific Management."[18] Because of eye trouble, Taylor was compelled to leave Phillips Exeter Academy without graduating. Some years later, after serving an apprenticeship as machinist, and between jobs in industry, he graduated from Stevens Institute of Technology in 1883.

---

[17] James D. Mooney, *The Principles of Organization* (Rev. ed.; New York: Harper & Brothers, 1947), p. 1.

[18] To some extent the famous French industrialist, Henri Fayol, to whom we have already had occasion to refer, is recognized as sharing honors in the original analyses of scientific management. His chief work (cited in translation above) is *Administration Industrielle et Générale,* published originally in France as a bulletin of the Société de l'Industrie Minérale (1916).

His eleven years of service with the Midvale Steel Company (1878–1889) provided the practical background which stimulated his interest in the scientific consideration of management and production. During this period Taylor held various production jobs ranging from gang boss to chief engineer. A short service in clerical work no doubt helped him recognize the functional relationship between office and shop activities — an insight which later developed into his "functional foremanship" plan.

Taylor's functional foremanship attracted considerable attention in those industries interested in the new science of management. He came to the conclusion that the good machine-shop foreman must, besides being a good machinist, perform eight different functions. He also decided that only a few foremen possessed the ability to perform even from three to five of these functions acceptably. It was natural, therefore, that the foreman's work should be broken down into its component skills and that specialists should be assigned to each of them. Taylor's analysis of the foreman's job divided it into the following activities or functions:

Office	*Shop*
Time and cost clerk	Gang boss
Instruction card clerk	Speed boss
Work order and route clerk	Repair boss
Disciplinarian	Inspector

Taylor explained the purpose of his idea by stating: "Functional management consists in so dividing the work of management that each man from the superintendent down shall have as few functions as possible to perform." [19]

Under his functional plan, each of Taylor's foremen had charge of all workers with respect to the functional activity assigned to him as foreman. It is readily observable that this plan violated the common-sense principle of unity of command, which provides that each worker should have but one boss. Although the new plan did not show up well in practice and had generally been abandoned by 1920, nevertheless his idea led to wide acceptance of the functional principle in management. It supported the line-and-staff type of organization, discussed in Chapters 7 and 8 on Organization. It also resulted in the foreman's being unburdened of some of his excessive duties.

The inspection function of the foreman, for example, has now been taken over by the inspection department; the time-and-cost-clerk functions have been transferred to the payroll and costing departments; the instruction-card activity is now performed by some section of industrial engineering;

---

[19] *Shop Management*, p. 99. A bibliography of Taylor's most important writings is given in the following footnote.

the work of the repair boss has been shifted to the maintenance department; and the job of the work order and route clerk has been taken over by production control. All of these activities, formerly saddled on the foreman, are now operated as functional aids (staff) to the (line) foreman. In addition to these functional aids, developed largely as a result of Taylor's analysis, the new personnel department has assumed many activities formerly assigned to the foreman.

After leaving Midvale, Taylor joined the Bethlehem Steel Company, where his interest shifted to testing the new method of scientific management in its wider applications. The same approach to industrial and management problems was also carried on at Cramps' Shipbuilding Company and other places. It was not long before Taylor was engaged in general management consulting for industry. The chief task that he set for himself was to increase worker productivity by improving and standardizing machines, tools, materials, methods and workplaces. From improvement in the processes and tools for metal-cutting, Taylor went on to expounding better methods of shop management and finally to scientific management in general.

Taylor's writings are not so voluminous as one might expect from the amount of time he devoted to the wide range of subjects he considered. Two of his early papers were presented at meetings of the American Society of Mechanical Engineers. The first, in 1895, was entitled "A Piece Rate System"; the second, on "Shop Management," was read to the Society in 1903. In 1905, in collaboration with Sanford Thompson and Edward Smulski, he published *Concrete, Plain and Reinforced,* the same year as his presidential address to the ASME, "On the Art of Cutting Metals." *Shop Management* was published as a book in 1911, followed in the same year by *The Principles of Scientific Management.*

The *Principles* resulted from hearings before the Interstate Commerce Commission to consider railroad requests for increased freight rates. Taylor supported the opposition in contending that the current rates would be satisfactory if the railroads adopted the principles of scientific management. In January 1912, a Committee of the House of Representatives, at the request of organized labor, investigated the effects of the Taylor methods at the Watertown Arsenal. It was at these hearings that the term "scientific management" was first used. The national publicity given the hearings, together with Taylor's new book, gave the first real impetus to scientific management as a movement.[20]

[20] Testimony to the vitality of Taylor's writings is the frequency with which they have been reprinted. The following bibliography gives the more recent editions:

"A Piece-Rate System" first appeared in the *Transactions* of the ASME, Vol. 16 (1895), pp. 856–903. It is reprinted in Thompson, *op. cit.,* pp. 636–683.

Concrete, Plain and Reinforced (4th ed.; New York: John Wiley and Sons, Inc., 1925).

On the Art of Cutting Metals (New York: The American Society of Mechanical Engineers, 1907). And see also the introduction to this work, reprinted in Thompson, *op. cit.*

Shop Management, which appeared originally in the *Transactions* of the ASME, Vol. 14

During the latter part of his life, Taylor was the subject of many criticisms by organized labor, who complained that his methods led to speed-up of the worker. Labor's negative attitude was reinforced by the rise of a management cult whose members dubbed themselves "efficiency experts." Without training, experience or a professional approach, these charlatans were responsible for a temporary eclipse of the scientific management movement. In explaining his attitude toward labor, Taylor declared that he was not opposed to its separate organization, but he contended that if the principles of scientific management were adopted there would be no need for labor to organize to obtain adequate wages, reasonable hours or improved working conditions. He argued that all such labor demands were included in any scientific approach to management, and that hours of work and proper machines, tools, materials and working conditions were prerequisite to increased productivity, which naturally led to higher wages and lower unit costs.

In conclusion, these are the fundamentals that Taylor stood for and urged on both workers and management:

1. *Research* and experimentation with machines, tools, materials, workplaces, operators and all other phases of production and management for continued improvement and better productivity.
2. *Planning* of all the operations of management and production, including routing and order of work, specifications, written instructions, and availability of materials.
3. *Training* of workers in the skills for which they are fitted and the improvement of those skills by competent supervision.
4. *Standards* for operations, including methods, times and wages, for workplaces, tools, materials and for the plans and procedures of management.
5. *Controls* for checking results against established standards.
6. *Cooperation* between workers and management.

Taylor's philosophy was that the application of scientific principles to management would produce higher wages and less fatigue for workers, lower unit costs, higher profits for employers, and increased purchasing power for the public, all because of increased productivity.

Henry L. Gantt was directly associated with Taylor at the Bethlehem Steel Company, and it was natural that his philosophy of management should follow the Taylor pattern. His writings emphasize substitution of scientific methods for the habit of basing industrial decisions and procedures on what had been done, or what someone thought could be done.[21]

(1903), pp. 1337–1456, and *The Principles of Scientific Management,* originally published by Harper & Brothers (1911), are both reprinted, together with excerpts from the testimony before the House Committee, in F. W. Taylor, *Scientific Management* (New York: Harper & Brothers, 1947).

[21] The principles which Gantt espoused are contained in his three books: *Work, Wages and Profits* (New York: The Engineering Magazine Company, 1913); *Industrial Leadership* (New Haven, Conn.: Yale University Press, 1916); and *Organizing for Work* (New York: Harcourt, Brace and Howe, 1919).

The *Gantt Charts* have probably done more than anything else to establish the fame of their author. They are used extensively for control, planning, machine and department loading, machine and man idleness, and for recording progress trends. Two standard factors are considered for such control — the item dealt with and the time taken. These two control factors naturally lend themselves to recording on the vertical and horizontal axes of the typical chart form. Gantt Charts are widely used by progressive concerns.

Gantt is also known for the "human touch" he added to Taylor's differential wage plan. Taylor's wage plan paid much higher over-all piece rates to workers who met the scientifically determined time standards. This idea worked a financial hardship on those who just missed the mark. Gantt felt that more consideration should be given to mediocre workers, to whom Taylor's plan assigned an over-all low piece rate. Gantt's plan paid the regular hourly wage rate to workers who failed to meet the time standard, but in addition there was a fixed bonus for workers who completed their daily assignments. Because of these and other features, the Gantt Task and Bonus Plan gained acceptance while Taylor's Differential Piece Rate System was practically abandoned. Gantt's human touch appears in a paper delivered to the ASME, in which he emphasizes that "the era of force must give way to that of knowledge, and the policy of the future will be to teach and to lead, to the advantage of all concerned." [22]

Harrington Emerson popularized "efficiency" both as a technical standard and as a philosophy. In fact, he called his philosophy the "gospel" of efficiency. In the introduction to Emerson's *The Twelve Principles of Efficiency,* Charles B. Going wrote: "The doctrines of efficiency therefore define something infinitely greater than a system of management. They set forth a morality, and provide practical measures for its attainment." [23] He also emphasized the importance of the line-and-staff type of organization as a tool for carrying out his principles of management, suggesting that "the industrial hook-worm disease is defective organization." [24]

In the same vein, Emerson contended that true efficiency ameliorates the condition of the workers, the employer and the nation. His outstanding work in the humanitarian field of management was in the Santa Fe Railroad shops. The problem was primarily a labor one, and he stressed the need for improvement and standardization of working conditions, the development of management control over operations, and an efficiency wage system.

---

[22] "Training Workmen in Habits of Industry and Cooperation," *Transactions,* ASME, Vol. 30 (1908), p. 1037.

[23] 5th ed.; New York: The Engineering Magazine Company, 1919, p. ii. The twelve principles are:

1. Clearly defined ideals
2. Common sense
3. Competent counsel
4. Discipline
5. Fair deal
6. Reliable records
7. Dispatching
8. Standards and schedules
9. Standardized conditions
10. Standard operations
11. Written standard instructions
12. Efficiency reward

[24] *Ibid.,* p. 29.

Frank B. Gilbreth is best known for his contributions to the field of motion and time study, through utilization of motion pictures. In connection with the analyses and improvements of workplaces, methods and worker motions, he continually sought the "one best way," meaning the best way known at the time. The one-best-way idea also included the necessity for seeking periodic improvements as new factors were brought to light under scientific scrutiny.

Gilbreth was assisted in his micromotion studies by his wife, Dr. Lillian Gilbreth, who has made important contributions of her own in the psychology of management. Because of the large volume of their published work, the Gilbreths are probably the most widely discussed of the pioneers in the field of management.[25]

Morris L. Cooke has been in active practice as a consulting management engineer for many years. Enthusiastic because of his proximity to the Taylor experiments and practices in and about Philadelphia, Cooke is notable for going beyond the industrial field in applying the principles of scientific management. When Director of Public Works of the City of Philadelphia, he consistently applied scientific methods in finding the "one best way" for solving the problems of city management. He received wide publicity for his scientific innovations and achievements on this job, many of which were copied by other cities.[26]

One of Cooke's contributions to the management of cities was a new style of communication, aimed at letting the citizen-stockholders really know what was going on in their Public Works Department. His annual report on the activities of his department, *Plain Talk,* was a new departure in public reporting. Statistics were relegated to the appendix, while interesting discussion, entertainingly illustrated, formed the body of the report. For perhaps the first time in American history, a city report was used for news items and editorials in Philadelphia and other cities. The experience gained in four years of managing a large city department was carried over to many subsequent federal assignments in this country and in South America.[27]

One of the early studies of the Carnegie Foundation, on the management of universities, was made by Cooke. It was probably the first study of its kind, in that it applied the accepted principles of industry to the management situations found in a number of our universities.[28]

---

[25] Dr. Lillian Gilbreth is teaching at Purdue University. The recent best seller, *Cheaper by the Dozen* (New York: Thomas Y. Crowell Company, 1948), by two of Gilbreth's twelve children, has added to the widespread interest in the Gilbreth contributions to management.

[26] Many of these new methods and procedures in city management are discussed in Morris L. Cooke, *Our Cities Awake* (Garden City, N. Y.: Doubleday, Page and Co., 1918).

[27] The author worked with Mr. Cooke during the final year of his service with the Department of Public Works in Philadelphia.

A third area for Cooke's application of the principles of management was in the field of labor–management relations. Imbued with the idea that labor and management had more interests in common than they had grounds for antagonism, and armed with the general respect of organized labor, he collaborated with Philip Murray, President of the CIO, in writing *Organized Labor and Production.*[29] The purpose of this study was to demonstrate that a rational integration of the organized labor movement with the profit and social motives of business evolved naturally from a proper consideration of the principles of scientific management.

These five names do not, by any means, exhaust the list of pioneer leaders in the field of scientific management, but they do form the core of that movement. Their work stimulated many others to refinements in the fields of organization and management. As competition, communication and trade increased, the ideas and principles of the leaders gained wider applications in this country and were finally included among our exports to other countries. Fayol, in France, was inspired to his *General and Industrial Management* by the so-called "Taylorism." Later, other countries, including Russia under Lenin, gave consideration to the new industrial rationalization. The first International Management Congress was held in Prague in 1924. Ten other international congresses to discuss management principles have been held in as many different countries since that time.

Current Trends in Industry and Management

Objectives of modern management

Certainly until 1900, and probably for some time after that, the objective of management was definitely expressed as the "profit motive." Until the philosophy of Emerson and other leaders in the field gained acceptance, that motive was practically exclusive. With the development of a more social outlook, the thinking of management gradually changed, and the social motive was added. One may conclude that the social idea is now so firmly intrenched as one of the objectives of modern management as to be called management's social imperative.

The profit motive of management is a foregone conclusion. Without it, private industry would gradually disintegrate for the simple reason that the necessary capital would be withheld by investors. Stockholders expect and demand dividends from profits; otherwise they may as well hold their cash surpluses and avoid the risk of loss by investment in business enterprises. A minimum of expected dividends is popularly set by the interest rate paid on government securities, which involve a minimum risk. Expected returns above that minimum are determined by the amount of risk involved in the enterprise concerned. There is ample room for discussion about the influence of the profit motive on individuals, but there is no question but that investors as a group expect a return which must be paid from profits.

---

[28] Morris L. Cooke, *Academic and Industrial Efficiency* (New York: Carnegie Foundation for the Advancement of Teaching, Bulletin No. 5, 1910).

[29] New York: Harper and Brothers, 1940.

Formerly, management gave much less consideration to wages and prices than to profits. The new social concept requires equal consideration for wages, salaries, prices and profits. It expects reasonable social and economic consideration for all these factors, after expenditures for materials and overhead.

Another and more important aspect of the social obligation of management is concerned with *productivity.* Modern management must assume the obligation of producing a reasonable minimum of all kinds of goods for all people, at a price they can afford to pay. Stated in another way, modern management must plan to supply the growing populations of the world on something better than a subsistence level. Failure to attain this world-wide objective will eventually leave gaps for the infiltration of ideologies that will promise something better, and thereby secure physical and political control with leveling down instead of up. If this observation is accepted as true, it is easy to comprehend the relation between productivity on the one hand and social, political and economic stability on the other. The growing gap between production and population can be filled only by an ever increasing productivity. How to reconcile population pressure and productivity is management's chief social consideration.[30]

Growth of modern industry

The expansion in all lines of business, including industry, has been continuous, and often spectacular, in this country since the establishment of the first cotton mills in New England during the two decades prior to 1800. Periodically, new processes and inventions have exerted stimulating influences throughout our entire national economy. The making of interchangeable parts and the use of the production-line method are outstanding examples of the effect of process changes on both productivity and volume of production. Inventions in the radio and television fields have contributed the most recent stimulus to business growth, which is always observable in one or more of the following items:

Capital investment
Number of employees
Volume of production
Floor space in use
Power consumption
Volume of sales

---

[30] In an article, "The Double Crisis," in *Science News Letter,* Vol. 55 (March 26, 1949), p. 202, Aldous Huxley wrote: "Every day brings its quota of some 55,000 new human beings to a planet which, in the same period of time, has lost through erosion almost the same number of acres of productive land and goodness knows how many tons of irreplaceable minerals." All this in addition to the organized destruction by man, in wars, of the natural and manufactured products of the soil.

Our industrial growth has not followed any set pattern. In some lines it has been built slowly from profits. In others, the rapid expansion of individual concerns has resulted from consolidations. The periodic popularity of combinations has contributed significantly to the growing concentration of modern industry.

Expansion has been both vertical and horizontal. *Horizontal* growth adds units of the same kind to the original concern. *Vertical* expansion integrates the business of the original company with different, complementary units. For example, a retail business expands horizontally when it establishes additional retail outlets; it expands vertically when it begins to job and/or manufacture the type of commodity which it formerly handled only on a retail basis. Vertical expansion may even extend to extraction or growing of the raw materials used in the production processes.

Horizontal expansion is promoted largely by the desire to reduce unit costs through large-scale enterprise. It is sometimes stimulated by the necessity or opportunity to invest surplus funds. Vertical expansion, on the other hand, is primarily sought for the purpose of controlling, as an integrated entity, the successive stages of production and/or distribution.

A more recent stimulant to the expansion of individual concerns is the urge to diversify the business in order to cushion the over-all effects of a general recession. All of these influences have contributed to the steady increase in the size of business units rated as leaders in their fields.

Accompanying the phenomenal growth of modern industry in this country has been a rise in the living standards of all classes. In most cases, large-scale production has led to both increased wages and lower unit costs. The resulting increased consumer demand has required higher production quotas, thus leading to an ever expanding circle of supply and demand. Table 2.1 shows the remarkable results of a hundred and fifty years of virile industrial growth — a record which no other country has equaled. Notice the unusually large proportion of small concerns.

Mass production and mass consumption have been the two outstanding factors of this period. Along with these we have experienced high productivity, high employment, increasing time for leisure, and increased instability in all phases of business. Growing pains have been the natural result of our rapid growth. While the general tendency has been upward, some of the valleys have produced major problems for management. Controlling the instability brought about by the rapid industrial growth of the first half of the twentieth century will be one of management's major problems for the next fifty years.

The past half-century has seen increases in productivity more striking than those in production. During the past three or four decades, industrial production per man-hour has increased slightly more than 3 per cent annually. While the machine is largely responsible for the increase, better management and improved methods have contributed their share. The man-hour productivity of the future will continue to increase through im-

TABLE 2.1

The 1950 Industrial Record *

Size of Firm	Number of Firms	Number of Employees	Value Added by Manufacturer † (In Thousands of Dollars)
Under 250 Employees	236,891	5,895,906	$32,166,969
250–500 Employees	5,817	2,008,563	12,432,172
500–1000 Employees	2,714	1,867,935	12,308,319
1000–2500 Employees	1,379	2,063,477	14,603,702
Over 2500 Employees	506	2,533,866	18,164,617
TOTAL	247,307	14,369,747	$89,675,779

* From U.S. Department of Commerce, Bureau of the Census, "The 1950 Annual Survey of Manufactures," Series MAS-50-8 (January 10, 1952), p. 4.

† "Value added" is total value less cost of materials, supplies, containers, fuel, electric energy bought and contract work.

provement of the machine. In addition, it is high time to look for new ways to stimulate the worker's interest in his machine. When management does this, the worker will begin to take more critical interest in the techniques of his monotonous routine and come up more often with suggestions for machine and methods improvements. This is the future path that will lead to "more and better products at less cost."

Unfortunately, the record shows that war's demands have been the greatest stimulus to increased productivity. In two years of World War II, for example, assembly-line techniques and the substitution of welding for riveting cut in half the number of man-hours required to build a Liberty ship. Instead of eight hundred rivets per day per man, the new machine made one hundred welds per minute.[31] Rising productivity in the future will depend on improved organization techniques, better management methods, more multiple-operation and fully automatic machines, improved production methods, horizontal as well as two-way vertical communication, and a larger flow of new ideas from the man-at-the-bench, who himself will benefit from the increased productivity.

Ownership and management

During the first hundred years of the Industrial Revolution, the rule-of-thumb operators of business were largely individual owners. Many adopted the corporate form,[32] but continued to control their companies in every way; Henry Ford is an outstanding example. Most small businesses were personally owned, in contrast to the current trend of incorporating to raise the necessary capital and limit personal liability.

---

[31] See Charles R. Walker, "American Productivity: I," *Fortune,* Vol. 33 (January 1946), pp. 150–156, 178–184.

With the continued expansion of industrial units, a size was reached by the early nineties when the "boss" could no longer manage the increasing number of separate functions and the more refined techniques which were used for their operation and control. When this stage was reached, management started to become a profession separate from ownership, but theoretically subject to its general supervision. Shares of common stock in these large companies are now widely scattered. Although the common stockholders are legally owners of the company, their interests are centered in dividends rather than in the company's managers and their methods. Because of this lack of interest on the part of the new absentee owners, and because of their handing over of policy decisions, through "proxies," to an inside group on the board of directors, professional managers rather than the new stock owners have become the real bosses.

This turn in modern management is important in labor relations because it has made business enterprises impersonal as well as professionally operated. It also enables a small group of top management, often with little or no investment in the company, to intrench itself in managing, and either through representation on, or dominating influence over the board of directors, to determine company policies as well. Where the majority of the directors are also full-time employees ("inside board"), management is in the doubtful position of approving its own acts, in the name of the company's owners.

By this process we have reached a situation where many large corporations are ruled by a group of self-perpetuating professional managers. The democratic organization often becomes a dictatorial operation. Most stockholders do not realize this change, and those who do are usually satisfied as long as they receive satisfactory dividends. Whether or not the practice of business management should find some means of coming closer to its theory of owner determination is a moot question. The saving grace in this situation is the right of the common stockholders to call the tune when management fails to make reasonable profits. The difficulty in exercising that right lies in the large number of small investors without real organization.

In spite of outstanding examples to the contrary, the new management, in general, is not taking undue liberties with its gradual usurpation of the stockholder-owner's position. Just as the politician's general extension of the franchise made his position a bit more precarious, so has the recent corporate custom of dining stockholders at annual meetings made management more conscious of the skepticism of the company's real owners. In both cases, the "handout" has not worked exactly as the donors expected.

---

[32] The various forms of ownership are explained in Chapter 10.

Conclusions

In spite of the huge contributions from America's workshop, there is a continuous cry for more and better plants, tools and equipment. Although industry is reported to have spent more than six billion in 1950 for plants and equipment, a survey by *Business Week* revealed that twenty billions more are required to put our industrial machine in first-class condition.

The progressively stepped-up outpouring of products has had several prominent economic results:

1. National wealth and buying power have increased.
2. Productivity has risen about 3 per cent annually.
3. The number of jobs has steadily increased.
4. Working hours have sharply decreased.

Table 2.2 compares the purchasing power of an hour's work in the leading countries of the world. It shows the unmistakable advantage to the individual who shares in the American production system. Mass production has made the living conditions of the masses in this country the envy of most of the world. The comparative purchasing power of the countries listed is a startling picture of the relation between individual buying power and the growth of modern industry.

TABLE 2.2

Comparative Purchasing Power in Twelve Nations *
(1950)

Country	Purchasing Index †
United States	100
Norway	71
Great Britain	65
Denmark	62
Ireland	48
Switzerland	48
Germany (Bizone)	42
Netherlands	39
France (Paris)	36
Austria (Vienna)	30
Italy	26
U.S.S.R. (Moscow area)	18

* From U.S. Department of Labor, Bureau of Labor Statistics, *Monthly Labor Review*, Vol. 74 (June 1952), p. 658.

† This index is based on the food-purchasing power of average hourly earnings of industrial workers in each of the countries, using the United States as a base.

Modern management must give serious consideration to three factors in continuing to improve the standard of living: first, improving the productivity of the worker through still higher investments in machines; second, minimizing wastes of all kinds, including the inefficiencies of management and government; and finally, finding better ways of doing things. It is also reasonable to expect that management will give more effort, and contribute better results, to organization and techniques, fields which have been relatively neglected in the emphasis on production.

It is obvious that although an abundance of natural resources, inventive genius, the profit motive, and a free political society are in a large sense responsible for our industrial productivity and general business progress, nevertheless the successful coordination of these factors has been dependent on the resourcefulness of modern management.

QUESTIONS

1. Why has the development of management principles been slower than the improvement of machine techniques?
2. What is the difference between rule-of-thumb and systematic management?
3. What does scientific management add to systematic management?
4. Define management. If you feel that the definition offered in the text is unsatisfactory, be prepared to criticize it in detail.
5. Describe the relationship among administration, management and organization.
6. How has the field of management benefited from Taylor's functional foremanship?
7. Explain the significance of Taylor's six fundamental contributions to managerial effectiveness.
8. For what is the Gantt chart used?
9. How did Gantt put the "human touch" into Taylor's differential wage plan?
10. Why did Emerson refer to his "efficiency" philosophy as a "gospel"?
11. What is Gilbreth's outstanding contribution to the field of management?
12. To what three fields other than business did Cooke urge application of the principles of scientific management?
13. What is management's chief social imperative?
14. Name five evidences of business growth.
15. To what three factors must management direct its efforts in continuing to improve living standards?

CHAPTER 3

Management Problems

Frederick W. Taylor said that the solution of management problems requires about 25 per cent technical or scientific treatment and 75 per cent common sense. Whatever the correct mixture, many stockholders feel that top-management pay should be based on its ability to work out correct solutions to its problems. In applying the tools suggested by Taylor, it must be observed that the scientific method and common sense are often used in practice as names for procedures which bear little resemblance to their titles.

Business managers often insist that the problems of their concerns are so different from those of all other firms as to defy the application of general principles. Lack of knowledge of the problems of other companies, and the principles applied to solving them, is usually father to their thoughts. It was the universality of the problems of management that gave birth to the international conferences for their consideration.

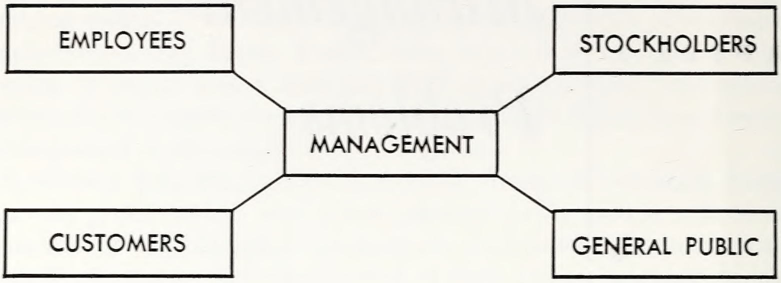
In what fields do most of management's problems fall? The list is a long one, even when one considers them merely as categories. Financial, purchasing, mechanical, production and sales problems are all placed in the lap of management for decision. Social changes affect demands for products and the prices consumers will pay. Economic changes have both short- and long-term effects, the most striking being the business cycles. Politics confronts management with problems of taxation and regulation. Finally, labor poses problems of supply, training, wages, grievances and productivity, to mention but a few.

The four pulls on management

Management's problems are intensified because they are in the center of four pulls, each of which is antagonistic to the others in certain respects. Figure 3.1 illustrates this situation. In theory, the four pulls represent a composite picture of sharply defined groups, with the desires of each group being represented in diametrical opposition. For example, while the employees of a particular concern may want high wages, the stockholders will generally be interested in holding wages as low as possible. Similarly, the

FIGURE 3.1

The Four Pulls on Management



stockholders may want high prices for their products while the customers will insist upon low prices.

However, this complete opposition will seldom, if ever, hold true. Frequently, two or more of the four groups will be in at least partial accord on certain issues. There should be almost complete agreement on the degree of quality necessary for a company manufacturing high explosives. Both employees and customers demand high quality in the finished product to insure safety in production and use. The stockholders also want high quality to help insure the company's future sales. The general public will also demand high quality from the standpoint of the concern's moral obligations to those who use its products. In this example, all four groups will be in accord in their respective demands. By going down the line from complete accord to sharp opposition, it can be seen that the possible combinations of opposition and agreement of the four pulls on various issues are innumerable.

In actual practice, members of one group may also be members of one or more of the other three groups. For instance, a customer or employee may also be a stockholder, and a stockholder will also be a member of the general public. While in one situation a person may be demanding low prices as a customer, he might also demand high prices as a stockholder, to increase his dividends.

As these examples illustrate, the picture of the four pulls loses its sharp focus, and tends to become a jumbled mass of overlapping demands and groups. It is management's job to recognize these pulls and attempt to achieve some sort of balance among them. It is also management's job to reconcile the various pulls while maintaining the concern in a sound and progressive position. If management goes too far in satisfying the demands of one group, it will soon incur the wrath of one or more of the other groups.

In certain situations management must consider more seriously the demands of one group than those of the others. This is obvious when the employees are represented by a strong, aggressive union. The stockholders must often yield when in conflict with demands of the workers. The success of the company may hinge more strongly on good labor relations than on any other factor. A different situation affects a concern operating in a highly competitive field, where the customer market must receive prime consideration. Specific conditions and circumstances often temper the actions of management in achieving balance among the four pulls.

The constant effort on the part of management to maintain all four groups or pulls in comparative harmony is frequently reflected in attempts to identify the interests of two or more groups. The post-war effort to sell stock to employees and to the general public has such a purpose. Management makes other efforts to identify the stockholders with the employees, and the general public with the stockholders. The purpose of these activities is to lessen the distinctiveness and opposition of the various pulls — to blend them for a greater degree of harmony.

No matter what specific plan management may adopt, it is important that a point of balance be reached where all groups are at a maximum level of satisfaction in relation to the other groups. It is not enough for management merely to recognize the existence of the four pulls. It must also recognize the significance of each group's demands, actively seek to maximize satisfaction for each group, and finally recognize the possible disastrous effects if one group becomes the exclusive concern of management to the serious detriment of the others. At best, the four pulls present a delicate situation which must be handled with full cognizance of the effects of misguided activity.

Finances

Finances and labor are too often unrecognized by management as the sources of its chief problems. Records of the credit agencies show that the majority of business failures are caused by the lack of managerial training, skill and experience. The management of finances is often the early stumbling block that leads to the final fall. Although figuring initial capital requirements is about as elusive for the amateur as determining the cost of altering a home, nevertheless there are certain basic considerations. Credit terms allowed to customers, the product price field, the time that raw materials and finished products must be held before processing and distribution, the length of the production cycle, the channels of distribution, and the necessity for research are all important factors influencing capital demands.

The nature of the product often determines the relative amount of required capital investment. A crushed stone business has relatively low cash requirements for raw materials and processing equipment. It may keep its investment low by selling at the pit, thus avoiding the purchase of trucks. On the other hand, many manufacturing concerns make large outlays for machinery, equipment and tools. If some machines are of the special purpose type, obsolescence will increase capital requirements. The national average for machinery investment per employee has now reached about $7500. In steel production it is reported as approximately $10,000. Since productivity is dependent largely on investments in machines and equipment, their cost per worker will rise as the pressure for increased productivity continues.

Another financial problem of management is the balance among its common and preferred stocks, bonds and commercial borrowings. If relatively steady profits are assured, the business may be financed by a majority of bonds at low carrying charge, thus providing higher returns for the risk capital. If annual profits are not reasonably assured, then common stock will be a protection against the annual interest charges of bonds. The question of stock control is also important. In some cases it suggests two classes of common stock — voting and nonvoting. In many states, failure to pay dividends on preferred stock for a certain number of years permits a representative stockholder committee to take over management of the company. When commercial borrowing is depended on for a portion of the operating expenses, it must be of such a temporary and recurring nature as to permit periodic liquidation. Otherwise, such financing is looked on as a "capital loan," suggesting that the business has not been adequately financed.

The purpose and amount of reserve funds is another financial concern of management. Even when such decisions are made by the policy-determining board of directors, management customarily furnishes the data and recommendations on which the conclusions are based. With the increasing financial demands and contingent liabilities faced by all business concerns, there has been developing a marked tendency in the better managed companies to "play safe." Such protective foresight, in the form of various reserve funds, has been nurtured by the income tax laws which allow them as deductions under approved circumstances. Against which eventualities should the concern protect itself, and to what extent, are problems which must be re-examined from time to time as economic, social and political changes require.

Labor

With the rise of organized labor and its political contacts with governmental agencies, management's problems in this field have grown apace. The expansion of business concerns into units so large as to minimize the personal touch with the worker or his organization is another cause of friction.[1] The preachments of many labor leaders have strengthened the centrifugal forces that separate management and the workers. Management's lack of appreciation of the main causes of the breach, and the obvious desire of certain elements to hide their heads in the sands of time, hoping that the storm will spend itself, are equally indefensible.

Occasionally labor strife, but more often management's desire to increase productivity, leads to such improvement in machine techniques that even skilled workers are thrown on the labor market. Whereas the investor's interest and that of the general public favor technical improvements in production, the public as well as the labor organizations look to management to take care of the workers who suffer because of technological improvements. Technological unemployment is now recognized as one of the problems for which management must find a solution by providing other jobs through expansion or retraining, or in setting up protective reserve funds on a company- or industry-wide basis.

---

[1] The National Labor Relations Act (1936) and the Taft-Hartley Act (1947) have greatly restricted the opportunities for employer and employee to associate or deal on a man-to-man basis.

Against management's efforts to increase productivity, organized labor often interposes an unofficial and artificial restriction of output. Foundry core-makers are able to cut drastically their normal bench production without observable conscious effort. Many journeymen and other workers are apparently able to adjust their work pace so as to "come out even" on any preconceived production schedule. For those concerns which do not plan production on a scientific basis, restricted output is a major management headache. This problem applies largely to hourly rated workers, where the guilty either enter a categorical denial that they are restricting output or plead management's demands for quality production as a defense.

"Feather-bedding" increases unit costs and selling prices. It is a polite form of dishonesty which no one seriously denies, which management has ranted about for years, but which no one has had the courage to stop.[2] Whereas one might expect the government to take measures against such economic waste, it has actually encouraged the practice in notable instances through mandatory legislation such as the railroad Full-Crew Law.

"Fringe-benefits" should have been considered long ago by management as a part of wages. Some benefits are justifiably an obligation of management; others are in a questionable category; still others find their justification purely in economic pressure. Increasingly these "benefits" have become problems for management; they will be discussed more fully in Chapter 24.

Labor–management negotiations, irrespective of the subjects considered, involve problems which are predominantly human ones. A large section of management increases its labor problems by putting them in the legal category and employing only those learned in the law to assist in their settlement. Experience shows definitely that the use of legal assistance in direct negotiation of heated disputes with organized labor is usually detrimental to both sides. What is needed is negotiation and arbitration, neither of which is advanced by legal pleading.

---

[2] On a large underwater construction job in Atlantic City, the union insisted that the contractor employ a "pressure inspector" for the benefit of the workers, at an attractive daily stipend. After the contractor discovered that the inspector was doing his caisson inspection on the surface, he insisted that the function be performed in the air chamber. The pressure inspector resigned; he had never been in a caisson and did not care to share such a risk with his labor brothers. On a hotel construction job in the same city, the union insisted that a steel rigger ride along with the driver from the railroad yards to the construction job "in case a beam falls off the truck."

Marketing

Price fields and sales outlets are important management problems. Should the concern make, or deal in, low-, medium- or high-priced merchandise? The low-price field requires less capital investment in materials and often in mechanical equipment, its production cycle is shorter, and consequently turnover is faster. Profits are smaller on a unit basis, but production volume is greater, hence total net profits are usually commensurate on equal sales volumes. The high-price field is customarily more difficult to break into, but the low-price field always has greater competition, partly because more beginners start on that level in order to avoid high capital requirements. The medium-price field has a combination of the advantages and disadvantages of the upper and lower price fields.

The scientific method for appraising the comparative opportunities at the various price levels involves primarily a survey of the supply and demand for the commodity at different levels of quality. If the concern is new, such a survey may find a solution to the problem, assuming that financial backing is available for any price field. If the concern is not new, other factors will be involved. To what extent will it have to invest in new machinery for production in a new price field? What are the comparative demands for production floor space? What are the territorial limits within which the various quality levels can be distributed? This question involves a comparison of values and bulk with transportation costs. Will the new equipment be of a special or general type? If special, then the extent and continuity of the market are essential considerations.

Having decided on the price level, what sales channel shall be used? Manufacturers' sales agents, wholesalers, jobbers, retailers and direct selling to consumers are some of the possibilities. A combination of two or more such outlets may be the solution. Even if it is decided that direct sales to consumers will result in the largest net profit, there are still at least two further possibilities — solicitation by catalogue and mail order, and door-to-door sales.[3]

If the manufacturer, jobber or retailer is successful in attaining a wide distribution, a protecting trade-mark may become a valuable asset. The use of a trade name may also influence the sales channel to be used.[4] If a trade-mark is used, should all orders be solicited from jobbers and retailers under that label, or should some of the merchandise be sold under the trade-mark of the purchaser? These are merely a few of the outstanding problems of marketing.

[3] Fashion Frocks, Inc., of Cincinnati, uses the door-to-door sales plan for dresses in the low-price field. Florida Fashions, Inc., of Orlando, operating in the same price field, sells through mail orders solicited by seven catalogues mailed throughout the year. Both plans are successful.

[4] Because of its widespread sales, Sears Roebuck uses several trade names for items produced for it by other concerns on a contractual basis.

Purchasing

The first problem in purchasing is whether buying should be centralized in a separate department on a functional basis, or be done by the individual departments of the concern. In department stores it is customary for the sales-department heads to do their own buying. The purpose is to fix responsibility for sales. It is reasoned that if the buyers have good judgment in their selections, quantities, and the prices they pay, then they should be able to sell what they buy. The same practice holds in wholesale establishments. On the other hand, it is customary for some concerns to concentrate buying in a special department. This method often obtains better prices and quality, more prompt delivery, and better service from vendors, besides keeping total inventories at a reasonable minimum.

Whether buying is done on a functional or a departmental plan, there is always the question of controls. Shall purchases above a fixed amount be subject to the scrutiny of superiors? If so, what is the maximum amount which shall be allowed buyers on their own initiative? Above that maximum, shall purchases be reviewed by a vice-president or by a committee? Shall purchases be made on an item basis, or by annual contracts? Shall prices be on a contractual basis, or at the market? What arrangements shall be made for inspection and possible adjustment if items are unsatisfactory?

There is also the question of whether the purchase of certain large quantities, especially raw materials, shall be made by some specialist or a committee, rather than by the director of centralized purchasing. To what extent should company policy permit speculation in the purchase of raw materials? How should purchasing quotas be established — on a production-cycle basis or otherwise for industrial concerns, on a seasonal or some other basis for retailers and jobbers?

Should purchasing be made by sealed bids or by personal negotiation with the vendors? For obvious reasons, public institutions lean toward the sealed-bid plan, while private concerns feel that they can get better prices by negotiation.

Buy or produce?

Most jobbers and retailers buy their merchandise, although there are outstanding exceptions among large concerns which manufacture at least a part of the goods they offer for sale. The problem is more difficult for manufacturers, where it applies mainly to parts (components). Should certain parts be bought or made, and what circumstances should be considered in arriving at a decision?

Quality being equal, price would be a primary consideration unless special circumstances dictate otherwise. For example, it might be thought inadvisable to have some work done outside the plant because of the desire to have its composition or nature remain confidential. Or quality may be so important that the concern does not care to take the risk of having the job done on the outside. Assurance of delivery is always important, especially in assembly work where time is of the essence. Failure to deliver on time may not only increase unit costs, but will also result in delayed delivery to customers.

When general business conditions are dull, outside contractors will be likely to give a favorable price, prompt deliveries, and a product that meets rigid specifications. But what will happen during boom periods when a manufacturer depends on contracting out a large share of his components? Price, quality and delivery may all suffer to the detriment of the buyer.

Another consideration is the cost of the equipment necessary to make the desired parts or components. If production involves expensive machinery, possibly of a specialized nature, the capital expenditure may be inadvisable or even impossible. Here the question of volume would have some weight in the decision. If, on the other hand, idle general-purpose equipment is available for making the part, the decision is simple.

Besides the necessary machinery and equipment, there is the problem of getting employees capable of doing the work. If production of parts necessitates extensive training of present employees, or the hiring of capable workers, the advisability of contracting on the outside is suggested.

Again it may be that the part in question is so highly specialized that it is difficult for the buyer to know whether he is getting a fair price. If the machinery investment is not too great and the problem of finding qualified workers not too difficult, it may be well to make some of the desired components. This solution will give the concern some first-hand data on costs. It will also be in position to improve the production processes and pass on such ideas to the supplier of the other parts. In addition, the user will not be in a complete dilemma when boom conditions cause the outside contractor to raise his price, slow up on his deliveries or cut the quantities. The user will have an opportunity to increase his production of the item by expanding facilities, especially since he already has experience with its manufacture.

From the foregoing suggestions, it is clear that management's decision whether to buy or produce parts or components is not an easy one. Before reaching a decision, all of the elements must be weighed in accordance with the special situation.

Specialization versus diversity

This problem asks the question: should a concern concentrate in making and/or selling one or a few products, or diversify its line into a larger number of items? There are the further questions of how extended the diversity should be, and to what extent the products considered should be of similar or different natures.

Some years ago, the canny Scotsman, Andrew Carnegie, announced the business principle of "put all your eggs in one basket, and then watch the basket."[5] It is obvious that specialization leads to improved production

---

[5] One of L. P. Alford's principles of manufacturing management states that: "Concen-

"know-how," and lower unit costs. Since marketing has also become a highly technical function, specialization in production would appear to promote sales. On the other hand, it is contended that a "full line" of a given commodity, or a wide variety of items in related fields increases the salesman's opportunity to interest his prospect. Should the brush manufacturer add floor wax and furniture polish to his product line?

Diversification is prompted by three sets of circumstances. One is to meet the competitor's offerings, another is to invest free funds, and the third is to erect a protective economic covering for those periods when sales fall off generally, or when one or two lines are adversely affected by changing public habits or styles.

Wholesalers promoted a vertical expansion of their lines before retailers in specialty lines caught the idea. During World War II, when it was difficult for retailers to buy many kinds of consumer goods, they turned to diversification. They bought anything that was available and added it to their stock in trade. Gasoline stations became small shops for gadgets of all kinds. Drug stores expanded into small department stores.[6]

General Motors is an outstanding example of production diversification. Starting as a producer of motor cars and trucks, it first diversified by buying the production facilities and trade rights of other automobile manufacturers. Then it expanded into the production of goods in allied lines, either starting from scratch or absorbing established producers. Production of brake linings is an example of its expansion into an allied line. Then it went out of its original field altogether and added plants for making such things as powdered metal parts, electric motors and refrigerators. Currently it has 115 plants in this and other countries, producing an almost countless number of items. So spread out is its empire that organization is an important management problem.

It must not be inferred from this discussion that a simple decision to diversify solves a concern's problems. The producers and distributors of ladies' hats and dresses, for example, are compelled to diversify or quit. But this kind of expansion creates its own problems. Organization is of vital importance for the effective management of widely diversified concerns. General Motors has been successful in practicing decentralized management with limited centralized control. But the theory is more easily stated than practiced. It has many facets which must be correlated and conquered to make it work.

One of the chief pitfalls of diversification of dissimilar lines flows from

---

tration upon the manufacture of a single or a few types and sizes of a product tends to improve the quality and lower the production cost." Although the statement is undoubtedly correct, we shall see that when this principle is applied in practice, sales may be adversely affected.

[6] An outstanding example of diversification in the drug business is the "Webb City" concern at Tampa, Florida, advertised as "the largest drug store in the world." It is spread over several contiguous stores with two or three floors in various sections, offering everything from ladies' wear of all kinds to tonsorial services. It also sells drugs!

the corporate desire to invest large cash balances in a relatively short time. Expansion involves the human frailty of prestige. Too often the urgency of this craving for prestige leads to rash decisions which more thorough investigation would have dubbed unwise. This is particularly true when new plants, new machinery and new managerial skills are bought on the open market, in contrast to absorbing plants already in operation. Additional operating funds, access to needed raw materials, and the necessity for steady distribution are a few of the added problems, whether the expansion is an addition to the existing plant or an additional plant manufacturing a dissimilar product. Effective management becomes more difficult as diversity is extended into multiple-plant operations involving the production of dissimilar products.

It is interesting to consider specialization as it is sometimes applied to geographical centers. An outstanding example is Detroit, whose future may be vulnerable if some new form of transportation starts to interest America's traveling public. Detroit's extreme specialization has been extended to satellite cities like Flint and Pontiac, which serve the central hub. Some industries have worked themselves into potential difficulties by overspecialization. Their futures may be as vulnerable as their specialization is tight.

In conclusion, it is suggested that before a company decides to add a new type of product, it should consider such questions as the following:

1. Will the new product make use of some of the existing machines and equipment?
2. Does the company have enough of the management and worker know-how to avoid an extended period of experimentation?
3. Is there a sufficient and available market, subject to penetration, to dispose of the new product profitably?

Machine replacement

The replacement of machinery and equipment is a continually recurring problem for management. Its solution depends on two groups of factors. One group is subject to more or less exact financial measurement, while the other must depend largely on management's judgment. An example will best explain this problem.

The production superintendent wants to replace an old machine with a new model because he believes the old machine has become obsolete. Management has two problems in the direct financial category. One is the comparative annual operating costs of the old and new machines; the other is liquidation of investment in the new machine. The cost price of the new machine is \$12,000 and its life expectancy is ten years. Its salvage value is estimated at \$2000. The annual depreciation is, therefore, \$1000 — \$10,000 spread over a ten-year-period.

The company is also entitled to interest on its investment in the new machine. One idea is that interest on the annual investment should be at the same rate the company has to pay for borrowed money. The other contention is that the company should charge interest at the same rate it is earning on its total investment. The company's bank borrowing rate may be 5 per cent, while its earning rate may be 10 per cent. Naturally, the 10-per-cent rate is more conservative from the machine purchase standpoint, so it is used in the subsequent calculations.

The other annual charges against the new machine include such items as labor, supplies, power, repairs, space used and apportioned factory overhead. Calculation of the estimated annual cost of the new machine is shown in Table 3.1.

The original cost of the old machine was $10,000 and its life expectancy is estimated at ten years. It has already been in operation for seven years. Its salvage value at the end of its three more years of life is $1000 and its present worth is $4000. Since it has three more years of useful life, its annual depreciation charge will be $1000 after allowance for a salvage value of

TABLE 3.1

Comparison of Annual Costs for New and Old Machines

COSTS OF NEW MACHINE		
1. Depreciation		$1000
2. Average Interest at 10%		750
3. Operating Costs		
a. Labor	$2000	
b. Supplies	100	
c. Power	200	
d. Repairs	100	
e. Space rental	50	
f. Allocated overhead	100	
Total Operating Costs		2550
TOTAL ANNUAL COSTS		$4300
COSTS OF OLD MACHINE		
1. Depreciation		$1000
2. Average Interest at 10%		300
3. Operating Costs		
a. Labor	$2650	
b. Supplies	150	
c. Power	250	
d. Repairs	200	
e. Space rental	50	
f. Allocated overhead	200	
Total Operating Costs		3500
TOTAL ANNUAL COSTS		$4800

$1000. The total annual costs of operating the old machine are also shown in Table 3.1.[7]

Table 3.1 tells us that, if our method of estimating the operating costs of the two machines is accurate, the company's total annual costs will be $500 less for the new machine, and its annual operating costs will be $950 less. Since both annual and operating costs are lower for the new machine, it is obviously a good buy for the company.

Those factors influencing machine replacement which do not lend themselves readily to such measurement include:

1. Available funds
2. Comparative quality of product
3. Demand for the product involved
4. Obsolescence period of the new machine
5. Flexibility in the use of the two machines
6. Degree of operating safety of both machines
7. Relative repair downtimes

The final management decision to buy or not to buy may rest on an evaluation of such relatively indeterminate factors as these, especially if the annual operating costs of the two machines are nearly equal.

Another accepted approach to the purchase decision is based on the time required for the new machine to pay for itself. Some concerns have a definite policy about the length of time allowed. For special-purpose machinery, the period may be as short as two or three years. For general-purpose machinery, where obsolescence is not so important, the standard repayment period may be as long as ten years. The annual operating savings of $950 for the new machine in our example are only a part of its profit-making potential. Assuming that both machines can make an annual operating profit of $1000, then the $950 annual operating saving on the new machine should be added to its annual profitability, making a total of $1950. On this basis, it would take about five years for the new machine to pay off its $10,000 net investment.

---

[7] The method of calculating the average annual interest for these two machines may need a word of explanation. This figure ($750 for the new machine, $300 for the old) is obtained by adding the interest on the present value of the machine to the interest on the value of the machine during its final year of operation, and then dividing this sum by two. (For a new machine, the "present value" is, of course, the same as the cost of the machine — in our example, $12,000.) The value for the final year is the salvage value *plus* the figure for annual depreciation (since the salvage value applies only *after* the final year of operation, not during it). Thus, if:

$V =$ current value of machine,
$D =$ annual depreciation,
$S =$ salvage value, and
$r =$ rate of interest,

then the formula for the average annual interest (i) is seen to be:

$$i = \frac{rV + r\ (D + S)}{2}$$

Break-even point

Management must always be concerned with the break-even point — the point at which expenses or costs are equal to income or sales. It can be plotted on a chart (the break-even chart) which shows the relations of sales to both volume of production and unit costs. (In nonmanufacturing businesses, "expense" is substituted for cost of production.)

The break-even point is not an ultimate goal toward which management strives; it is more in the nature of a mark beyond which management can call itself successful, and below which danger signals are raised. The businessman wants to know what volume of sales he must have, at given unit costs of production, in order to make a profit, which starts just above the break-even point. This is one of his pressing and often mystifying problems. The break-even chart does not give the whole story; when, for example, the break-even point is not reached, the chart does not tell whether the problem is primarily in the area of sales or of expenses. But if it does not tell *what* is wrong, it very definitely says that *something* is wrong, and in this respect it is a valuable guide, to be supplemented by management judgment, in planning action for increased sales or decreased expenses, or both.

The profit and loss statement has for many years been the conventional method of measuring management's effectiveness. Its chief defect is that it tells the story only at the end of the fiscal or operating period. The break-even chart shows the results in advance, based on varying conditions of sales and costs. The president of the National Association of Cost Accountants has called it "one of the most valuable tools in the management kit." [8]

Since the chart's break-even point, and the amount of profit or loss, are dependent primarily on the unit cost of production, these costs must be computed as accurately as possible. There are three types of costs which relate to sales volume.

1. *Fixed costs* are those which usually do not vary so long as the company is operating. Interest, taxes, insurance and depreciation are examples. To a large extent such costs are beyond the control of management.
2. *Semi-fixed, or controllable, costs* do not vary directly with sales but they can be regulated or controlled to a certain extent by management in relation to sales volume. Advertising, research and salaries are examples of items which can be increased or decreased at the discretion of management or administration.
3. *Variable costs* are those which vary directly, to a large extent, with

---

[8] Excellent articles on the break-even point will be found in *Modern Industry*, Vol. 16 (December 15, 1948), pp. 40–43, and in *Business Week*, No. 1030 (May 28, 1949), pp. 20–22. The chart is discussed at length in Walter Rautenstrauch and Raymond Villers, *The Economics of Industrial Management* (New York: Funk & Wagnalls Company, in association with Modern Industry Magazine, 1949). Its application to production control is outlined in Lawrence L. Bethel and others, *Production Control* (2nd ed.; New York: McGraw-Hill Book Company, 1948).

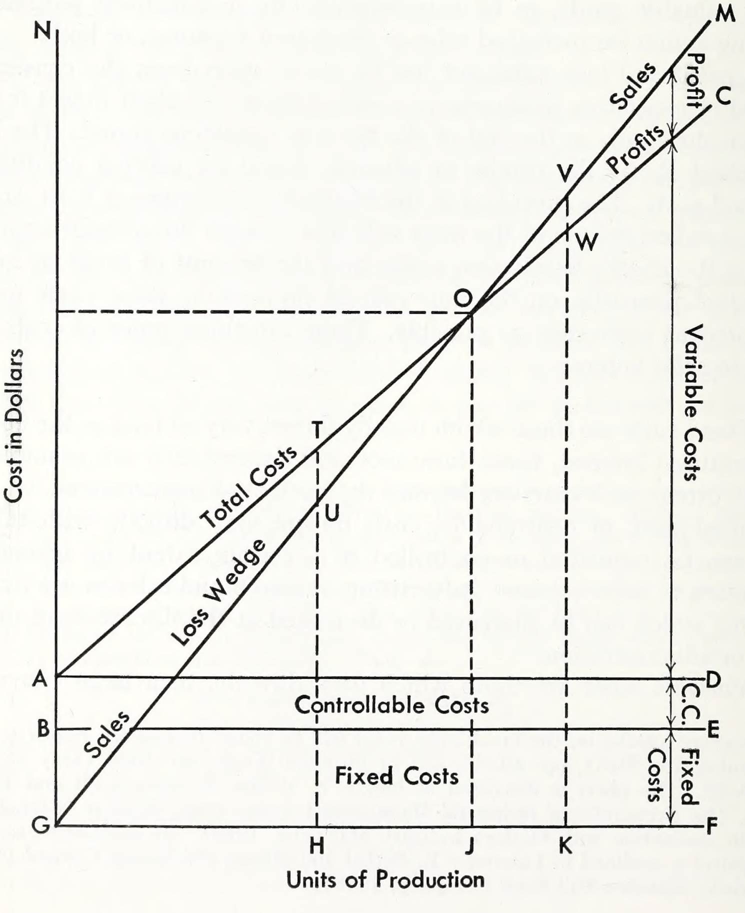
sales volume. Direct labor and materials, overhead and the cost of sales are examples.

Since fixed and controllable (semifixed) costs are relatively stationary in their relation to sales at a given time, they are considered as constant in a simple form of the break-even chart. Variable costs are composed of groups of similar expense items which may be broken down for refined control purposes. Fixed and variable costs may be computed separately, or variable costs may be subtracted from total costs to determine fixed costs, which are sometimes considered as a lump sum because they have fewer components. Fixed costs are more difficult to allocate if the chart is being prepared on a departmental basis. To make further comments more tangible, a typical simple form of break-even chart is illustrated in Figure 3.2.

The horizontal axis (GF) represents units of production, and the vertical

FIGURE 3.2

Break-Even Chart



axis (GN) represents cost in dollars. The line GM indicates volume of sales, running from zero at the lower left-hand corner of the chart, to full production at the upper right-hand corner. Fixed costs are indicated by the perpendicular distance between the parallel lines GF and BE. These lines are parallel because fixed costs are regarded as the same amount irrespective of the volume of sales. Controllable (semifixed) costs are also considered as the same regardless of sales, so they are indicated as the perpendicular distance between the parallel lines AD and BE. As has been stated, fixed and controllable costs are not considered as variable in the ordinary sense.

The angle CAD represents the rate of increase in variable costs, which rises as production increases. The line AC shows the rise in variable costs with increases in production. The perpendicular distance from the horizontal axis GF to line AC represents total costs for the amount of production at any point selected on the base line GF. The point O, where the "total cost" line AC crosses the sales line GM is the break-even point.

At the break-even point sales, or income, equal the total cost of production, or outgo. The angle AOG, referred to as the "loss wedge," shows increasing loss from operations as sales decrease. In other words, it indicates the ratio of loss to decreasing sales. Likewise, the angle MOC, referred to as the "profit wedge," indicates increasing profits from operations as sales increase. It shows the ratio of profits to increasing sales. The loss resulting from the volume of production at point H is represented by the line TU, and the profit resulting from the volume of production at point K is VW. The volume of production required to break even is represented by the point J on the horizontal, or "Units of Production," axis.

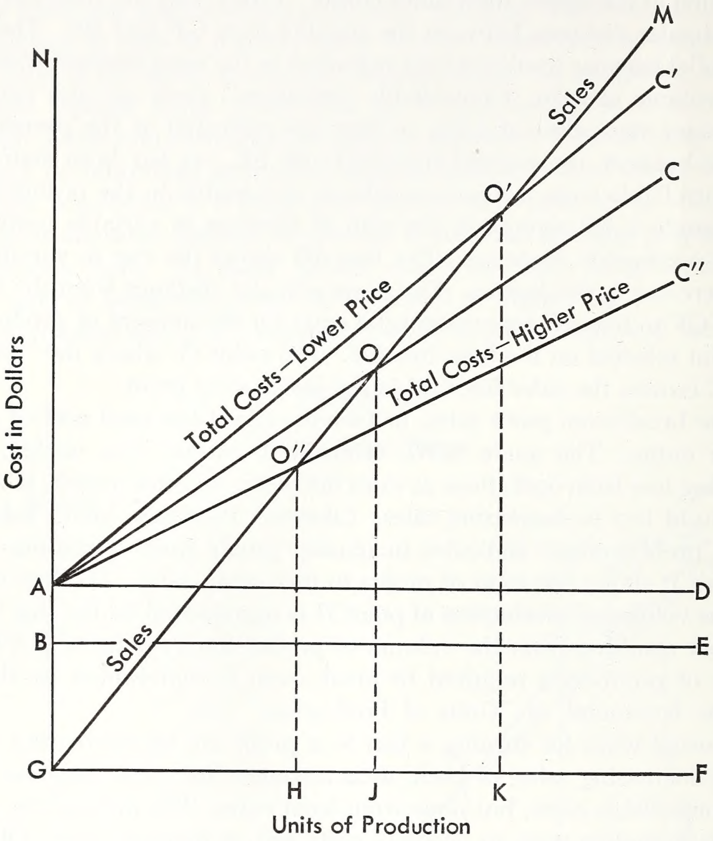
The usual ways for turning a loss to a profit are by decreasing variable costs or increasing sales, or both. It is assumed that some help can be had from controllable costs, but none from fixed costs. The managerial problem amounts to finding ways to decrease costs and/or increase sales. Obviously, any reduction in the unit selling price will require an increase in production sufficient to stabilize the dollar volume of sales, otherwise there would be a decrease in profits or an increased loss.

It may happen that severe competition compels lowering the selling price, or a growing demand makes it possible to raise the selling price. Figure 3.3 is a graphic representation of what happens to the break-even point under these two conditions.

Normally the volume of production, and consequently the variable costs, will be increased by lowering the selling price. On the other hand, when the selling price is raised, normally the volume of production, and consequently variable costs, will be decreased. In Figure 3.3 line AC represents total costs at various production levels before either of the price changes. The break-even point is at O, where the cost line AC crosses the sales line GM. Line AC′ shows the rising variable costs as production increases at the lower price. The point where this line crosses the sales line at O′ is the new break-even point. Line AC″ shows the variable cost trend of different production

FIGURE 3.3

Break-Even Chart Reflecting Changes in Selling Price



volumes at the higher price, which would customarily reduce sales. Point O″ is the break-even point for this situation.

It is obvious, therefore, that a decrease in the selling price, with unit costs remaining the same, will require a higher volume of production to break even. Decreased variable unit costs may accomplish the same purpose as increased sales. An increase in the selling price will lower the break-even point if the volume of sales, and variable unit costs, are maintained.

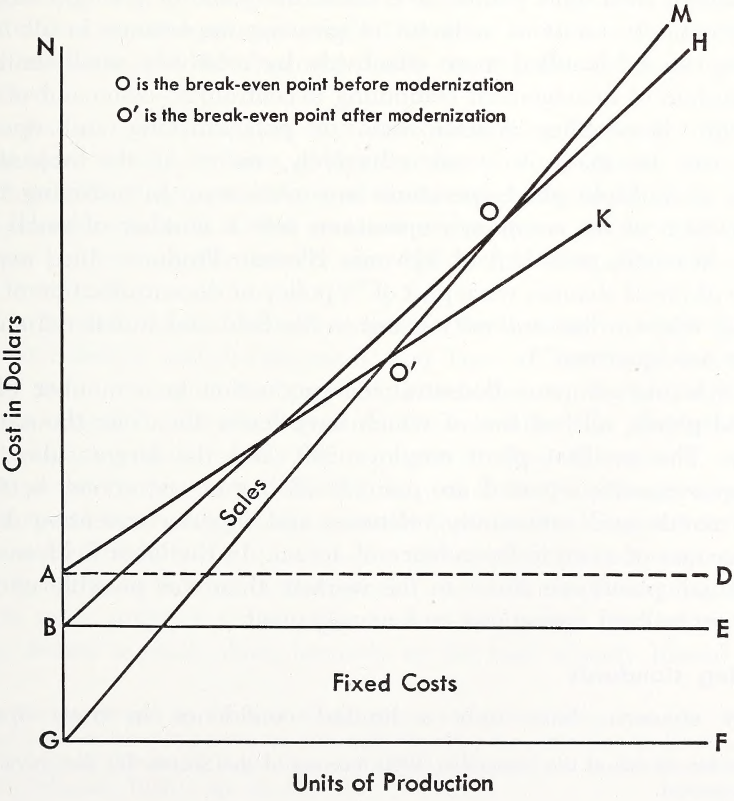
The break-even chart may be used for still another type of problem. Instead of a single machine replacement as already discussed in this chapter, it is proposed to spend a large amount of money for machinery and equipment modernization, involving increased fixed costs for such items as interest and maintenance, but decreased variable costs because of improved productivity. A chart such as Figure 3.4 estimates the profit or loss which will result and hence the desirability of the proposed change.

The chart shown is a simplified form, but sufficient to illustrate the principles involved. In actual practice there are other cost variables which may affect the result. For example, if a plant is operating on two or three shifts, the ratio of cost to volume of production might well vary among the shifts, making it necessary to draw the cost lines as curves, or even as a wavy line. However, it is possible to determine the break-even point for each shift. Although most of the cost factors will be more difficult to determine with acceptable accuracy, comparative profitability of the different shifts can be shown graphically.

In Figure 3.4 GF represents units of production, GN the cost in dollars, and GM the sales. The perpendicular distance between lines GF and BE measures the sum of fixed and controllable costs before the expenditures for machine modernization. The distance between lines GF and AD represents the sum of fixed and controllable costs after the increase in capital expenditures. Line BH shows the increases in variable costs as production increases — before the modernization. The point O, where line BH crosses the sales line GM, is the break-even point.

FIGURE 3.4

Break-Even Chart Showing Results of Machinery Modernization



The purpose of the modernization is to increase productivity, and thus reduce variable costs. Line AK is the new variable cost line after modernization, and point O′, where AK crosses the sales line GM, is the new break-even point, which should naturally be lower than point O if the modernization is well planned. When the costs are accurately plotted, the location of O′ will determine whether the modernization should be carried through as planned.

Decentralization of operations

Most large concerns, and many medium-sized ones, give serious consideration to the problems of centralized operations. For many years it has been normal to increase plant size with each increase in production capacity. Recently, however, the advantages of decentralization through geographically scattered plants have become more obvious. Normally it should be easier for management to operate and control a centralized operation, but normality changes with the times.

Labor and markets have both been important considerations in the new emphasis on scattered plants. Living conditions for employees are often better in small communities, whereas large centralized operations tend to make over-sized communities. Labor relations have been found more congenial where small-unit plants have taken the place of a single large one. Also, community relations, a factor of growing importance in all lines of business, can be handled more effectively by relatively small units.

If a system of management combining decentralized command of operations with home-office centralization of policy-making and operations control can be made to work effectively, many of the objectionable features of multiple plant operations are overcome. In justifying the decentralization of his company's operations into a number of small plants, Don C. Mitchell, president of Sylvania Electric Products, Inc., explained that the physical changes were part of "a policy of decentralization of manufacturing wherein line authority is out in the field and functional authority stays at headquarters." [9]

The Sylvania company decentralized production in a number of small scattered plants, all but five of which have fewer than one thousand employees. The smallest plant employs 230, and the largest about 2900. The improvements reported are more flexibility in operations, better employee morale and community relations, and superior executive development because of more independence of action. In the labor field, managers of the small plants are closer to the workers than was possible under the former centralized operations and management.

Operating standards

Many concerns have only a limited confidence in their operating standards, and many more have no standards. In most cases the various operating standards are based on company experience rather than on scientific analysis. Standards based on experience can be just as unreal as the past experience itself can be out of line. In other cases, no recognition is given to the fact that standards change with the conditions that create them. Improved machines and equipment, and worker training in improved methods, call for new standards. The same is often true when materials or working conditions are improved.

---

[9] From his speech at the November 1950 meeting of the Society for the Advancement of Management.

An equally important problem with operating standards is worker acceptance. Unless the workers are convinced that company standards are honest and scientifically correct, they may do more harm than good, in lowered morale. So there are two important phases to this problem of operating standards: they should be correct, and the employees must believe that they are correct. The first phase is a problem for scientific analysis, while the second is a problem of psychological persuasion.

Research and development

As yet, there are no laws or rules to determine whether the company should spend any money, and if so how much, for research and development of products, methods, distribution and many other activities of management; these problems still have to be left largely to the judgment of administration and management. The same is true with the distribution of research and development funds among the different categories considered.

It is now a well-established fact that most large concerns, and many medium-sized ones, attribute a large share of their success to product research and development. Many of these companies set aside a percentage of sales for research. Often research expenditures extend over a period of years before tangible results are obtained.[10] Sometimes no usable results materialize.

For large and medium-sized companies the problem is how much to spend on research and development, and how to distribute those funds. For the small concerns, the problem is whether to budget any money at all for research and development. Occasionally they feel that if the large companies have profits from research, they themselves ought to institute research programs. But it may well be that those large competitors spend more on research annually than the total capital investment of the small imitator. In spite of the allure of large-company successes in the research field, and of the special cases of small-company success, common sense suggests a distinctly conservative policy for the small companies. Better to walk along leisurely in the trail already blazed by the giants than lose themselves in the underbrush, trying to beat out new paths of their own.

---

[10] Du Pont's research in the field of chemistry is an outstanding example. Numerous magazine articles have appeared on this subject. See, for example, E. F. Higgins and G. C. Thompson, "Research Expenditures Increase," *Conference Board Business Record*, Vol. 10 (February 1953), pp. 82–87.

Government regulation

It is almost impossible to listen to management men discussing their problems without hearing something about government regulation of business. Not only is the required reporting on a multiplicity of forms disturbing, but many official regulations, with their changing administrative interpretations, are worse. To the small company, the regulations are vexatious, confusing, and sometimes a source of actual fear. Many large companies have expensive special sections devoted exclusively to municipal, state and federal reporting; reports to the federal agencies are the most exacting and time-consuming.

Business cycles

Finally, recurring business cycles, which have increased in intensity with the years, are a management problem which always threatens future planning. Why is it, for example, that the big steel companies have expanded their productive capacities with great reluctance in spite of the fact that the demands for their wares have increased periodically for a number of years? From bitter experience, they fear that a recession will find them with plant capacity far beyond their ability to sell. These cyclical economic storms are weathered by the large companies; for the little fellows they are often disastrous. Smallness alone is accountable for some of the business failures in an economic crisis, but another cause is failure to consider the cycles in their planning, if indeed they plan beyond the demanding present. Large concerns — unlike small ones — can afford to employ economic analysts to advise them of the time and nature of future business cycles, with their possible effects on company operations, with respect to both volume and types of products. They can even afford to contribute to the leveling of certain types of recessions in their particular fields.

Conclusions

There are several broad considerations affecting management decisions about any of the problems discussed. In the first place, profits still measure, in a general way, the success of business operations. Directors and management feel bound by this criterion. Business losses may be temporary or chronic. It is the latter type which demands management's scientific analysis and best judgment. The welfare of employees, stockholders and the buying public are important considerations in making management decisions; so also is the prestige of the company. New office buildings are often constructed to satisfy management's desire for prestige, in spite of the fact that they may involve expenses not offset by commensurate savings.

Finally, public and employee welfare receive attention after an acceptable profit base has been established. Likewise, the prospect of losses has often interfered with the prosecution of such plans. The policies and actions of competitors are an important influence on employee welfare plans. While they are often adopted in the hope that they will result in increased productivity, the desire to reduce labor turnover appears to be a more compelling motive.

The mere mention of these considerations which demand management's most critical judgment suggests the involved problems posed by the "four pulls" discussed at the beginning of this chapter. The ramifications and interrelations of those basic interests are involved in many of the other problems which have been treated. The adjustments necessary for balancing the respective interests of these four groups underlie, in large part, the degree of success in establishing and maintaining profitable operations and expanding socio-economic interests.

QUESTIONS

1. What did Taylor conclude about the importance of common sense in making management decisions?
2. To what extent are managerial problems universal? What is the basis of some management claims to the contrary?
3. Give examples of the effect of social, economic and political changes on business problems.
4. What are the "four pulls on management," and how can they be controlled?
5. Outline some of the financial problems of business.
6. To what extent does organized labor present a problem for management? Mention three specific examples.
7. What are some of the business problems in the field of marketing?
8. Under what conditions is it advisable to have purchasing done on a departmental basis?
9. Enumerate five considerations which influence the decision to buy or to make components.
10. What changes in business conditions have made it unrealistic to follow Andrew Carnegie's advice about "putting all your eggs in one basket"?
11. What are the advantages and disadvantages of diversifying a product line?
12. How can the break-even technique be used to decide whether the selling price should be raised or lowered?
13. What advantages accrue from decentralizing the operation of an industrial concern?
14. Comment on how government regulations present problems to business. What is the difference in their effects on large and small enterprises?

CASE PROBLEM

THE MUNFORD MANUFACTURING COMPANY

The Munford Manufacturing Company is considering the purchase of an improved machine to replace one that may soon become obsolete. In addition, the superintendent feels that the new machine may reduce operating costs for the processes under consideration.

The present machine cost $6000 when it was new. It is now five years old, with a life expectancy of five more years. Its present value is estimated at $3500, and its scrap value at the end of five more years is fixed at $1200. Its annual operating cost is: labor, $2400; supplies, $200; power, $600; repairs, $150; space rental, $100; and allocated overhead, $150. In addition, annual depreciation and interest on the investment must be considered, the latter at 4 per cent, the rate at which the concern borrows from its bank.

The new machine will cost $15,000 and have a life expectancy of ten years, after which its salvage value will be $2500. Interest on the investment should be figured at 4 per cent, as with the old machine. The machine-tool supplier has estimated the cost of annual operations as follows: labor, $2000; supplies, $50; power, $350; repairs, $50; space rental, $50; and allocated overhead, $38.20.

PROBLEM. From the facts given, what advice would you give the committee that makes decisions regarding the purchase of capital equipment? Would your decision be different if it were established that the new machine will have 60 per cent higher productivity than the present one? Support your conclusions.

CHAPTER 4

Management Principles

This chapter brings together the major principles of management, in preparation for their application throughout the book. Consideration of these principles as a group will help to clarify the interrelations among them and show how they contribute to the total concept of management.

Management, as we have seen, is the accomplishment of objectives through the use of men, money, materials, machines and markets. Scientific management, in its practical applications, is the planning and organizing of activities for attaining goals; directing these activities for smooth and balanced functioning, or coordination; and finally checking them against established standards and plans, or control.

Modern management, however, is not an entirely materialistic institution, operating for production and profit alone. On the contrary, with each passing decade business becomes more and more a social institution. Glenn L. Gardiner aptly describes this social phase of modern business:

> Industry is actually our greatest social institution. . . . We think of an industrial organization in terms of its human values. Its employees spend most of their working hours on the job. The conditions of employment determine whether living on the job is fruitful, satisfying and pleasant. Working with other people is, in a sense, a social function.[1]

Actually, this social phase of business and industry is one of the prime reasons for the development of those principles which serve as written guides for the successful integration of cooperative human associations.

Laws and principles

Laws. In distinguishing between systematic and scientific management,[2] we pointed out that the systematic approach contents itself, uncritically, with the installation of systems that have proved useful in the past. The scientific approach, on the other hand, tries to discover the principles that lie behind the success or failure of any given system. This distinction between the two approaches was illustrated by Taylor's successful series of experiments on the art of cutting metals. The result of his investigation was a set of *laws,* expressed as twelve mathematical equations to be solved simultaneously, which gave a precise answer to the questions: what tool should be used? what cutting speed? what feed? Once the laws had been formulated they became a *basis for decision.* No longer was the decision left to the individual machinist, who, relying on his own experience, might not any more than once in a hundred times come up with the right answer.

---

[1] "Four Aspects of Management," *Systems Magazine,* Vol. 16 (August 1952), p. 5.

[2] See Chapter 2, pp. 17–20.

A scientific law may be defined as *a statement about a relationship among phenomena, under specified conditions, which is invariably true as far as we know.* Note the proviso "under specified conditions." In practice, this is an important qualification. For example, Taylor's laws of metal-cutting are as true today as they were when he formulated them, but they are only infrequently used, because there has been a change in the conditions under which the experiments were carried out: the invention of new and better tools. This qualification — "under specified conditions" — is further important, because it will be seen later on that for many of the problems with which management must deal it is not possible to specify all the conditions.

The example from Taylor approaches a complete science. Taylor was able to take account of *all* the important variable elements that entered into metal-cutting, assign numerical values to them, and express the underlying laws in mathematical terms. It might be said that this is a goal toward which all sciences tend: the formulation of laws within a system of variables which is complete enough in itself to permit exact mathematical expression.

What has this to do with management, which deals not simply with relations among material things, but also with human beings? Were not the laws of metal-cutting that Taylor developed almost exclusively concerned with material processes and was it not for this reason that he was able to reduce the underlying principles of metal-cutting to exact laws? The answer is yes. When you introduce men and their motives as important "variables," the problem takes on quite different proportions. "It is true," said Taylor, "that the laws which result from experiments of this class, owing to the fact that the very complex organism — the human being — is being experimented with, are subject to a larger number of exceptions than is the case with laws relating to material things. And yet laws of this kind, which apply to a large majority of men, unquestionably exist, and when clearly defined are of great value in dealing with men." [3]

Taylor believed that "every single act of every workman can be reduced to a science."[4] Let us take a very simple example of how he went about reducing such an act to a science. Taylor was given the problem of discovering some law that would enable a foreman to know in advance how much of any kind of heavy laboring work a man who was well suited to his job ought to do in a day. A set of experiments was carried out[5] in which each man's work for each day was recorded in terms of the number of foot-pounds of energy he expended. But no consistent relationship could be discovered between the foot-pounds of energy exerted and the tiring effect of heavy labor. For the time being, here was a workman's act which Taylor could not reduce to a science.

---

[3] *The Principles of Scientific Management,* p. 119. Reprinted in Taylor, *Scientific Management* (New York: Harper & Brothers, 1947).

It was only years later, and after he had run the experiments twice without success, that one of Taylor's colleagues, Carl G. Barth, through careful analysis of "every minute element which could in any way affect the problem" finally found the principle. Barth took the data, represented each element graphically by plotting curves, and then studied the graphs to see if anywhere there was a curve that varied consistently with the degree of exhaustion of the heavy laborer. Again, the power expended did not, by itself, predict the worker's exhaustion. But this time, the reason why it did not was discovered, namely, if a man is standing still under his load, he is exerting no power at all, and yet the weight of the load is tiring him. So, discarding foot-pounds of energy as the significant variable, and substituting for it the amount of time that a worker is under load, it was discovered that physical exhaustion could be consistently predicted from a knowledge of the relative lengths of time that a worker was and was not under load. Taylor could now formulate the "law of heavy laboring" — that is, the law that applies to that class of work in which the limit of a man's capacity is reached because he is tired out. The law is stated: "For each given pull or push on the man's arms, it is possible for a man to be under load for only a definite percentage of the day."[6]

Taylor found, for example, that a man well suited to the handling of pig iron (where each pig weighs ninety-two pounds) can be under load only 43 per cent of the day and must be entirely free from load during the rest of his working hours. By applying this law, which meant in practice that the workman was ordered by one of his "functional foremen" to rest a specified number of times for specified periods, productivity in the handling of pig iron was more than doubled, and yet the workmen were not so tired as they often had been under the old arbitrary methods.

This example has been presented at some length because it illustrates several of the characteristics and techniques of scientific management to which we shall have occasion to refer again and again throughout the text. In the first place, it shows what we mean by saying that the scientific approach must be sure it takes account of all the details, no matter how small. Second, it gives an instance of what is meant by the establishment of a "standard" for work: knowing that a man assigned to heavy labor will work best when given fixed proportions of time under load and free from load, management has a standard for controlling productivity. The significance of this aspect of the example will become clearer in Chapter 9 on Managerial Control. Third, and most important for the present discussion, simple and clear-cut as this example is, it introduces an "intangible" factor. To say that a situation is affected by "intangibles" — as we have often had to do throughout this book — is not an admission that the condition is beyond the power of management to analyze and control. It is more in the nature of a warning that here is an area where we have not yet identified all the variables that may be operating, or that we are not able to specify all the underlying conditions and, hence, are not able to formulate hard and fast laws to govern the situation.

---

[4] *Ibid.*, p. 64.

[5] Described in *The Principles*, pp. 53–59.

[6] *Ibid.*, p. 57.

What are the intangibles in the illustration given above? For one thing, Taylor and his coworkers might well have said that some "intangible" was at work when they failed to discover a determinate relation between foot-pounds of energy exerted and physical exhaustion of the worker. It was a long time before they came upon the true principle governing exhaustion.

But there is an intangible factor of more significance in these experiments, one that lies hidden in the statement of the problem — how much of any kind of laboring work a man *who is well suited to his job* ought to do in a day. How do we know when a man is "well suited to his job"? Taylor's answer for this example is vivid, even if it leaves something to be desired in the way of scientific description: "One of the very first requirements for a man who is fit to handle pig iron as a regular occupation is that he shall be so stupid and so phlegmatic that he more nearly resembles in his mental make-up the ox than any other type. The man who is mentally alert and intelligent is for this very reason entirely unsuited to what would, for him, be the grinding monotony of work of this character." [7]

It can be seen, then, that Taylor's law really has to be applied with this sort of qualification: "For each given pull or push on a man's arms, *and with a specified mental make-up,* a man can be under load for x per cent of the day." This qualification introduces several intangibles. A man's "mental make-up" includes both his innate mental ability and his acquired attitudes and personality traits. Psychologists have already developed tests which provide a fairly good index of a person's mental capacity through the medium of an IQ score. Furthermore, these IQ tests have been used by all types of management — in industry, in commerce, in the armed forces — to place the individual in a job for which he is mentally qualified. They are a step in the direction of reducing an intangible factor to scientific analysis and control. But such tests are far from perfect indices of native intellectual ability and, besides, native ability is not the only criterion of whether a man will be, in Taylor's words, "stupid and phlegmatic." Psychology has a long way to go before a completely scientific description of such traits can be achieved.

---

[7] *Ibid.*, p. 59.

Principles. Whatever the intrinsic difficulty of trying to discover specific laws governing each act of every workman, the problem is nothing compared to that of trying to find laws that will describe, without exception, constant relationships in the general field of management — laws that will be as applicable to the management of a government department as they are to a giant automobile factory. To formulate such laws, one would have to know everything there is to know about engineering, economics, psychology, sociology, anthropology and perhaps a half dozen more specific sciences.

And yet, wherever there is a need for management, there are certain constant problems that arise. In the absence of scientific laws describing all the interrelationships of these constant problems, do there exist any generalizations, any working hypotheses, which can serve management, if not as infallible bases for decisions, then at least as *fundamental guides to action?* The answer is very definitely yes. It is to generalizations of this order that we give the name of *principles.*

A principle may be defined as *a statement about relationships among phenomena which has proved useful enough in practice to serve as a fundamental guide to action.* This definition of principles corresponds in a general way to the use of the term in most of the modern management literature. Some writers — Taylor, for example — have not made rigorous distinctions among laws, principles and rules. Others have given the name "law" to the kind of general statement that we are here calling a principle. One authority, for example, is credited with establishing some fifty general "laws of management"; if "law" is used in the sense defined here, then this is a practical impossibility in a field where knowledge is accumulating so rapidly and principles are being reformulated in the light of new knowledge. Whatever the differences in terminology to be found in the literature, it can be said that almost all authorities agree on the existence and importance of a class of generalizations which, though they do not have the fixed character of a law, are nevertheless crucial for the art and science of management.[8]

It must be emphasized at once that even though principles are not nearly so universal as laws in their applicability to concrete situations, they are no less important for management. In fact, many principles are more significant for effective management than laws. For it follows from the present incomplete state of our knowledge that fixed laws are likely to be established only for the simpler situations that management faces. Therefore, those principles which deal with the over-all coordinative problems of management will apply to a far greater range of problems than will a set of laws governing some specific process within the larger range. That is to say, even though there may be many exceptions in the application of a given principle, the principle may still have valid application to a greater variety of situations than a law.

---

[8] There are a number of generalizations that vary so widely in their applicability that they really do not have the status of either a law or a principle. These had best be referred to as "rules."

In the next section of this chapter, we shall present some of the most important principles of management. They did not come into being with the scientific management movement. Some of them were recognized centuries ago. Alford and Beatty point out that the principle of the minimum wage rate was known to the Babylonians as early as 1958 B.C.[9] The history of the formulation of management principles has had a long evolution, but it was not until the inception of the scientific management movement that these principles began to be formulated and classified on a large scale. There are about one hundred principles of industrial management, many of them overlapping, in the writings of Taylor, Gantt and Emerson. It should be noted that most principles of *industrial* management have valid application in other fields of management.

A final word on the application of principles. It will perhaps be remembered from Chapter 2 that Taylor's principle of functional foremanship was found to be at odds with the priniciple of unity of command. Such conflicts among principles are not hard to find. This only serves to underline the importance of *flexibility* in the application of principles. "The fact is," says Henri Fayol, "that the light of principles, like that of lighthouses, guides only those who already know the way into port, and a principle bereft of the means of putting it into practice is of no avail." [10]

Management Principles

Presented below are the most important of the general management principles. All of these can be thought of as "operating" principles of management. In addition to this categorization, the first three — Unity of Command, Span of Control, and Homogeneity — may also be classified as "organizational" principles of management. These (and others) will turn up again in Chapter 7 on Principles of Organization, and rightly so, for they can be pictured on an organization chart. The overlapping is inevitable, since organization is one of the chief functions of management. At the same time, these three organizational principles are too crucial to the general management process not to be included in the present list.

---

[9] L. P. Alford and H. R. Beatty, *Principles of Industrial Management* (Rev. ed.; New York: Ronald Press Company, 1951), p. 30.

[10] *General and Industrial Management,* trans. Constance Storrs (London: Sir Isaac Pitman & Sons, Ltd., 1949), p. 15.

1. Unity of Command

Each member of an organization should receive instructions about a particular task from only one superior. In an organization built on the unity-of-command principle, each member knows to whom he reports and who reports to him. The chain of command applies to all layers of the line, staff and service functions of the organization. For the purpose of exercising authority and responsibility, each person reports to one superior or supervisor. Unity of command makes both control and planning more effective. It aids in fixing responsibility for errors in judgment or action. It is based on the lessons of experience which point to the virtue, if not the necessity, of having a recognized chief for effective management and control.

If this rule is broken, says Fayol, "authority is undermined, discipline is in jeopardy, order disturbed and stability threatened."[11] Someone has aptly said that a two-headed organization is a freak of management. Even when two or three appear to have equal authority, there must be a *primus inter pares* to avoid confusion. This principle applies to the management of all types of organization and has been recognized for centuries in the church, the military, government and business.

2. Span of Control

There is a limit to the number of subordinates whom a superior can direct effectively. The span of control[12] is variously fixed from three to seven, depending on the nature of the responsibilities involved, and the capacity of the superior. If this number seems small, it must be realized that the supervisor's contacts cover more than direct relationships with his subordinates. In addition, his *cross* and *direct group* relationships must be taken into consideration. That is, if a manager has three subordinates, Jones, Smith and Brown, then he must pay attention to the relationship between Jones and Smith, between Jones and Brown, and between Smith and Brown; these are called the "cross" relationships. It may be that there are antagonisms between any two of these men which the supervisor should be aware of in assigning responsibilities. Furthermore, the supervisor will often relate himself to these three men as groups, rather than as individuals. At different times and for different problems, there are four different groups that can be recognized: Jones-Smith, Jones-Brown, Smith-Brown and, of course, all three men together. These are known as "direct group" relationships. Now it will be seen that the manager with three subordinates has ten relationships to consider: three direct, three cross, and four direct group ones.

The number of such relationships expands rapidly with the addition of each subordinate.[13] One authority summarizes the span-of-control principle in the following manner:

---

[11] *Ibid.*, p. 24.

[12] The span of control is occasionally confused with the span of management. Obviously, "control" is a more involved task than primary management. While the latter refers to directives or orders based on authority, the former goes further by checking on performance and taking the required action to assure return to control when it is lacking. The span of management will be, therefore, much greater than the span of control.

> The ideal number of subordinates for all superior authorities appears to be four. At the lowest level of organization, where what is delegated is responsibility for the performance of specific tasks and not for the supervision of others, the number may be eight or twelve. The number of levels in any organization should be a minimum sufficient to permit of this distribution of subordinates. . . . The subdivision of activities into too few levels encounters far more dangers than their subdivision into too many. Centralization of authority should always be regarded as a necessary evil to be kept at a minimum. It is a passport to bureaucracy.[14]

The span of control is also affected by the physical distance between the chief and his subordinates.

3. Homogeneity

An efficient organization should group only those duties which are similar or closely related. From the fact of the division of labor, which is really a law of nature, it follows that every person or unit in an organization should be assigned a single major task as far as possible. The object is to get better results with less effort. Most changes of occupation involve adaptation, which itself requires extra effort. Homogeneous assignments should be specific, should not overlap other assignments, and should be within the capabilities of the assigned worker or unit.

4. Delegation

The process of management is facilitated when all possible matters are reduced to procedural standards and plans and assigned to subordinates for action. Exercise of the delegation principle relieves the executive of standardized operations, enabling him to give more attention to organizing, planning and controlling. This improvement can be accomplished by delegation of managerial authority on all levels, including the foreman. The principle of delegation derives from the Exception Principle, which provides for executive attention to only those matters which are of an exceptional nature and cannot, therefore, be reduced to standard operating practices. The exception principle implies delegation.[15]

---

[13] The Theory of Graicunas establishes the relationships of the chief to his executive subordinates. The formula for the number of relationships is the sum of the three types already mentioned. If A represents the number of direct relationships, then the cross relationships, or B, would be $\frac{A}{2}(A - 1)$, and the direct group relationships, or C, would be $2^A - (A + 1)$. The total relationships would be A + B + C. Using this formula, the total relationships for two subordinates is 4; for five subordinates, 41; and for ten subordinates, 1068. See V. A. Graicunas, "Relationships in Organization," in Luther Gulick and L. Urwick, eds., *Papers in the Science of Administration* (New York: Columbia University, Institute of Public Administration, 1937), pp. 181–187.

[14] L. Urwick, "Axioms of Organization," *Public Administration Magazine* (London: October 1935), pp. 348–349. Quoted in Elmore Peterson and E. Grosvenor Plowman, *Business Organization and Management* (3d ed.; Homewood, Ill.: Richard D. Irwin, Inc., 1953), p. 117.

Furthermore, an unlimited span of control may easily lead to autocratic authority. Delegation is essential to the hierarchical form of organization, which assigns responsibility for entire functions to subordinate levels.

5. Planning

To secure satisfactory results, action should be planned. The development of a plan brings possible difficulties to the attention of the planner, making it possible to avoid pitfalls that might not otherwise be foreseen. Adequate planning visualizes the results before operations are started. Preliminary investigations may even lead to abandonment of a plan because of predictable obstacles. If it develops that the contemplated actions or procedures are feasible, the plan points out not only what should be done, but how, where, when and, occasionally, by whom it should be done. A good plan promotes the confidence that helps lead to success. The importance of having a complete plan prior to action is so well recognized that some concerns have separate planning departments.

Taylor demonstrated that in industrial concerns prior planning of the day's assignment for each worker, even though it means paying money for full-time planning personnel, actually reduces the total cost of operations by eliminating the wastefulness that results when planning is left up to the individual worker. This follows from Taylor's more general principle that management should assume at least as much responsibility for getting out a day's work as the workman himself. When planning is left to the worker, the result is often no planning at all.

6. Policy-Making

Effective management requires policies that are definite, complete and understandable. Policies are the precepts which guide administrative and executive decisions. They are based on the objectives of the organization for which they are established, and they are formulated by its administrative group.

Because policies are intended primarily as instructions for making managerial decisions, they should be capable of use in actual practice. Policies, like principles, are fundamental guides to action and they should be accorded that degree of stability which makes possible the accomplishment of planned objectives. At the same time, policies should have whatever flexibility is necessary to meet changing conditions. They should deal largely with fundamentals and only sparingly with details of procedure. Finally, they should be based on factual analyses rather than personal opinions.

---

[15] To illustrate our earlier contention that many of the fundamental principles of modern management are of ancient lineage, see Moses' application of the exception principle (Exodus 19: 25–26): "And Moses chose able men out of all Israel, and made them heads over the people . . . And they judged the people at all seasons: the hard causes they brought unto Moses, but every small matter they judged themselves."

If the organization is of considerable size, its policies should be contained in a manual for the guidance and instruction of those whom it affects. Policy manuals may be issued in sections for top management and for individual departments such as production and personnel.[16] Whether issued departmentally or as a whole, such a manual prevents many misunderstandings, places responsibility for errors of judgment, and aids in the indoctrination of members of the management team with company objectives.

7. Leadership

Wise leadership is essential to successful operations. Leadership is the ability to get things done by enlisting the efforts of other people. It is primarily a psychological attribute. The good leader is able to make his subordinates *want* to do the things they *have* to do. The good leader can maintain discipline at the same time that he instills a spirit of cooperation. He finds ways to develop an *esprit de corps* that will allow the group to work together toward its common objectives in harmony and unity. Leadership, whether it is formal (official) or informal is the personal quality which moves the organization on to the attainment of goals.

8. Staff Function

Management is facilitated in its directing function when there exists a staff whose total responsibility is the development of plans, ideas and standards for use by the line (directing) personnel. Because of the increasing complexity of business problems in general, and industrial problems in particular, top executives are making increasing use of staff advice. Complete investigation prior to decision takes much of the guesswork out of executive decisions. Likewise, the number of kinds of problems submitted to staff agencies is increasing.

The staff agencies have no authority over actions within the organization except under extraordinary and temporary circumstances, as assigned by the line superior. The only authority which the staff has is the authority of ideas. The staff agency may operate on its own initiative, or on a referral basis, depending on the authority assigned to it.[17]

9. Balance

The effective management of an organization requires that its various subdivisions be assigned the authority merited by their importance to the

---

[16] An example of top-management, or basic policy would be: "Competitive prices shall be effective in all lines, quality and quantity considered." An example of policy for the Personnel Department would be: "(a) Every effort shall be made to operate the cafeteria at cost. (b) The company's athletic program shall be planned to include maximum participation of employees." Many large concerns also issue foremen's manuals, but these deal more with specific instructions than with company policies.

[17] The staff function as a principle of management is discussed by Harrington Emerson, *Efficiency as a Basis for Operation and Wages* (3d ed.; New York: Engineering Magazine Company, 1912), p. 122.

accomplishment of over-all objectives. Balance should be sought in both the internal and external activities of the concern, but balancing the internal subdivisions will generally be found more difficult. Lack of balance is more prevalent than generally believed. It arises from the fact that many top executives reach their positions from continued and successful leadership in one of the company's main spheres of activity, such as sales, personnel, production or the controller's office. Long experience in any one of these may give them an exaggerated idea of the importance of the activity which they previously managed.

It is for this reason that over-all top managers are difficult to find. The top executive should play no functional favorites, lest the management of the organization be thrown out of balance. This lack of balance often happens, for example, when the director of sales is promoted to president. His lack of experience in other fields is likely to lead to an undue emphasis on the importance of sales for company success. As a result, the sales portion of the budget becomes lopsided. Within the author's experience, the general agent of a large insurance company helped organize, and became first president of a merchandising concern. Prospective profits brought a ready sale of the new company's common stock. Money was spent lavishly on all sorts of advertising, with the announced objective of making the new concern a leader in its field within an amazingly short time. The company's capital was exhausted before the manufacturing processes were well established, and a reorganization with considerable loss to the owners put the new concern under control of other interests whose president was not a salesman. Lack of internal balance caused the disaster.

10. Coordination

The greater the specialization, the greater is management's need for coordination of men, materials and machines. It follows from the organizational principles of management presented above that as an organization is broken down into more and more subdivisions, with each unit performing a single task and each subordinate reporting to a single superior, the possibilities of chaos are enormous unless management is constantly attentive to the synchronization of these subdivided activities. Coordination, which provides for the timed dovetailing of all operations, is the most important of management's functions.

Coordinative problems are present at every level of management. The foreman must see that the proper tools, materials and supplies are available to his men at the right place at the right time. On higher levels, management must see to it that the operations of whole divisions and subdivisions of the organization are dovetailed. Not only must management provide for synchronized operations; it must also assure harmonious working relations among the personnel both within and between departments. In addition to this horizontal coordination, there is always the problem of synchronizing operations vertically between the various levels of management.

11. Responsibility and Authority

Assignment of responsibility must be accompanied by authority sufficient for its accomplishment. Conversely, responsibility is a natural consequence of authority, and should exist to the extent that authority has been granted. Since authority is not only the right to command, but also the right to obtain obedience to commands, it is most unwise for authority to exist without correlative responsibility.

> It is of the greatest importance that delegation of authority go hand-in-hand with the assignment of corresponding responsibility, because the complexities of modern industry make it almost impossible for top management to lay down a pronouncement of policy in terms sufficiently explicit to eliminate the need for the broad exercise of judgment on the part of those who have to attend to actual execution. The judgment of these men, in the light of their more intimate and direct knowledge of existing conditions, is indispensable.[18]

12. Decision

Decisions should be made at the lowest competent level. Making decisions on the lower echelons of competency saves the time of superiors, and is valuable training for those making the decisions. Furthermore, decisions are made more quickly at lower levels than when they have to go up through the chain of command for answers. It is understood, of course, that having the responsibility for making decisions does not preclude the right — and the wisdom — of conferring occasionally with superiors about these decisions. The right to make decisions usually includes the right to standardize these decisions (when they are of the recurring type) in the form of regulations.

13. Standardization

Predetermined standards for measuring operations, procedures and controls are outstanding aids in management. As the statement implies, standards may be used in most types of engineering, in production, purchasing, safety, inspection, procedures and other management activities, including management itself. The main purpose of standardization is assurance of desired results. To be effective, standards should consist of the kinds of measurements that are readily applicable to the situations they are intended to control. Management effectiveness is measured in relation to standards established for its performance. The information applied to such measurements is often obtained by means of an activity survey. One of the chief uses of standards in connection with production of any kind is the application of methods and time measurements required for proper performance. This type of measurement is applicable to activities in many lines of business.

---

[18] From an address by Donaldson Brown, Vice-Chairman of General Motors Corporation, at the 250th meeting of the National Industrial Conference Board.

14. Control

Management's authority is not completely exercised until it has checked compliance with its orders through the use of controls. Control is the process of assuring that performance corresponds with plans. Standards are the measurements used for control. When orders are accompanied by instructions, performance is being guided by the standards contained in, or suggested by, the instructions. These stated or implied standards can be used to measure or control performance. Control provides the means for determining whether or not, and to what extent, all the subdivisions of the organization are performing the functions assigned to them, and in the manner provided. It is a form of management inspection which measures performance against established standards. Effective control is practically unworkable under any system of divided responsibility. Centralized management control of properly grouped and delegated functions is the directing principle, while integrated responsibility is the tool by which control is effected. Standards are necessary for control, and controls are necessary for balanced and coordinated management.

15. Flexibility

Ability to adjust to changing conditions is a measure of successful management. The ability to adapt policies, functions and activities to changing conditions is part of the rational approach to management. Institutions are never static; they are moving continually in one direction or the other. When management adopts a static attitude toward its own operations and their relationships, dry rot has started at the core and is spreading, whether or not it is visible on the surface.

Business is essentially dynamic and must be managed with that axiom in mind. No business will run itself. Progressive management continually seeks to anticipate changing conditions and adjust its policies and operations accordingly. The ability to adjust is the power to survive.

16. Facts

Action based on opinion will lose in competition with action based on facts.[19] This is simply a statement of the relation between rule-of-thumb and scientific management, including predictable success for the latter. The analytical approach, based on facts, is the accepted scientific method of all disciplines. Facts are, therefore, the basis for management's decision-making processes. Decisions must always be tempered by managerial judgment, but decision based on judgment alone is only rule-of-thumb management. All management problems must be approached by this fact-and-analysis method if consistency in decisions is to be maintained.

---

[19] Henry L. Gantt, *Industrial Leadership* (New Haven: Yale University Press, 1916), p. 89.

17. Human Relations

People perform better when they are recognized as human beings. Thirty to forty years ago, the significance of human relations to business was given little more than lip service. Today there are probably more pages being published on this subject than on any other phase of management. Increase in union power is only one of the reasons. A new recognition of the human element is noticeable all through society. This new awareness has given rise to so much social welfare legislation that it is estimated that one out of every six persons now receives a government check for one reason or another. It is the reason for the establishment and support of the United Nations and such actions as the war in Korea. In this country there has developed a strong "feeling for our fellow man," even when he lives far away and speaks a different language. Business became imbued with this feeling after it was demonstrated that the principle really pays dividends.

Practical experiments show that, on the average, happy workers are the best producers. It took management a long time to learn that workers have the same motivational patterns as they. One often wonders why so many professionally unqualified managers will drive themselves long hours, subjecting themselves to intense mental and physical strain, only to enjoy expensive funerals long before their appointed times. Such behavior might well be motivated by the love of power, which is merely one phase of the desire for recognition.

All workers desire recognition. Although financial reward is a prevalent urge for both workers and management, both are sometimes influenced by tokens of merit, awarded at ceremonies attended by their peers. Special privileges for long years of service, and other signs of personal recognition, are highly valued by most human beings. In many instances, management is more susceptible to the appeal of such symbols than the employees. Why is it that some members of top management, whose chief claim to fame is the accumulation of a fortune, are so pleased at the offer of an honorary university degree? One reason is the evidence it offers that their merits are recognized in a field for which they have never felt qualified — a type of recognition all the more gratifying because of its unexpectedness.

Scientific management has become convinced that maximum productivity is achieved by workers who are relatively happy on their jobs. This sort of incentive is a far cry from the "this-or-else" method of inspiration used by the now defunct bull in the production shop. It is also different from the paternalistic pattern of incentives, which traded a no-longer-wanted suit of clothes for extra hours at regular pay. The scientific approach, which is always the best at any given time, realizes that people perform better when they are recognized as human beings. The problem of management now is to find out what things appeal to a worker while at his bench, not after the work day is over.

The five remaining principles to be presented here are principles of industrial management. Although they are primarily applicable, as phrased, to industrial management, it will be seen that they are relevant to other types of management as well.

18. Specialization

Specialization improves the quality of the product (or service) and increases output, or productivity. Production specialization applies to the product, to the machines and tools used to produce it, to the job of producing it, and to the skill of the worker who is responsible for its production. The principle of specialization was consciously employed in ancient Greece. It was developed on a town basis in Europe during the medieval period, and it exists in this country on a spectacular level in Detroit's automobile industry.

Division of work is necessary to mass production. The greater the number of subdivisions, the more pronounced becomes the skill of the worker on any operation. Special-purpose machines and tools improve the quality of products and decrease unit costs through increased productivity. The skill required of the operator varies inversely with the amount of skill which has been transferred to the machine. Product specialization, which is the reduction of the number of kinds and sizes of goods to be produced, improves quality and lowers unit costs. The same result is obtained where businesses or plants specialize. Finally, management specialization at the middle and lower levels means narrowed responsibility and increased efficiency.

19. Simplification

Elimination of unnecessary methods or procedures, and the utmost simplification of those required, reduces human effort and improves managerial effectiveness and control. Simplification is achieved through the breakdown and analysis of methods, systems, procedures, functions and activities. It seeks to find the "one best way" by combining, eliminating, substituting and changing the sequence of elements or factors in a given method, procedure or operation. The simplest way is usually the best. Large concerns use unnecessarily elaborate methods and procedures more often than the smaller ones. Large operations offer the most fertile field for simplification analyses.

In small concerns, necessity alone makes for simplicity. That is one of the reasons why they can compete against large-scale operations. Simplicity of methods and procedures, the ability to make quick decisions and the superior service born of direct customer contacts all contribute to the efficiency of small concerns. The antithesis of managerial simplicity is red tape, which is always found in most abundance in large institutions.

20. Individual Productivity

A worker attains his best productivity when assigned to the work of his highest skill, either natural or acquired. This statement appears to approach the universality of a law. Everyone is less discontented when engaged in the type of work he can do best. His positive attitude toward the job induces a high degree of skill in performance, resulting in the best quality and quantity of which he is capable. Most natural skills can be improved through adequate training. They can be further improved through good working conditions and relative freedom from economic pressures. These attributes for promoting individual productivity with acceptable quality apply to all employee levels from the unskilled worker to the top executive.

21. Task and Accomplishment

The average worker accomplishes most when assigned a definite amount of work to be done in a given time. This principle comes directly from Frederick W. Taylor. Examples of its application are found everywhere. It is the exceptional person who can arrange his day-to-day activities efficiently when he has only a long-range target to shoot at. In the majority of cases, better results are obtained when long-range objectives are broken down into a series of short-range goals. Many college students are lost without definite daily assignments. Examination grades in specific courses are far more likely to provide a student with an incentive for performing assigned tasks than the more general goal of, say, success in college. In the same way, the daily task assignment in industry has been found to produce the best results.

The quality set for the assigned task is just as decisive as the quantity. If the type of assignment is beyond the ability of the worker, his discontent will make performance impossible. If the task is beneath his ability, he will lose interest and the lack of motivation is likely to show up in poorer results. To provide the proper stimulus, the work assignment should be of the quality and quantity that will bring the employee's highest ability into play while working at his normal speed.

22. Incentives

Incentive wages must be based on standards of accomplishment. Workers should be financially rewarded when they accomplish the standard task. The standards should be such that the average worker can meet them while working at a pace which he can maintain without unnatural fatigue. Taylor's incentive philosophy made it costly for the worker who did not meet the standard production times. The present incentive-wage philosophy guarantees the worker the hourly rate for his wage classification even when he fails to meet standard production times.

Experience has shown that the average worker produces more under the stimulus of financial incentives if he is convinced that the production-time standards are fairly set. To take advantage of this principle, management should set time standards only after working conditions and methods, as well as machines, tools and materials, have been geared to continuous production with favorable results. Equally important is the continuity of assigned time standards, unless some important factor, such as materials, methods, machines or working conditions, has changed considerably.[20] There is no general agreement as to the extent of change necessary for retiming. It can be assumed that both the workers and management should be satisfied that a change in the standard is advisable.

There are financial incentives other than those based on standard production times, and there are also employee incentives that have no direct relation to financial considerations. All types of incentives improve productivity if they are adaptable to the type of work and worker involved. This is one field where ready-made plans will be unsatisfactory in most cases; they must be tailor-made to fit the circumstances they are meant to serve.

Conclusions

It is important to recognize the distinction between a principle and a law. The latter is a fixed truth, while the former is a fundamental guide for making policies and carrying on operations. Principles must not be inflexible to the extent of stifling progress. They should be adjusted periodically to long-term and important changes. In practice, principles are the working tools of scientific management. As Gantt suggested, management based on scientific methods is as valuable as the plant or its equipment. Principles make up the core of scientific management, which develops systems to assure the execution of its purposes.

Some of management's principles can be applied in any endeavor where two or more persons are trying to effect a common purpose. Unity of command is a principle of universal application. So is the principle of span of control in large group efforts. The person who does not know how to delegate responsibility with adequate authority is no manager. His effectiveness is curtailed to the extent that he tries to do the entire job himself. The principles of human relations and planning are important factors of most operations, and vital parts of one that extends over a long period of time.

Well-defined and properly communicated policies aid the coordination of mutual effort, which is the outstanding principle of management. Wise leadership not only values highly the coordinative principle, but it leans heavily on staff assistance for important decisions. It soon learns that decisions based on factual analysis are superior to those based on the authority of position.

Individual initiative, which is one of the assurances of future success, is stimulated by various incentives, one of which is the practice of having decisions made at competent action levels. Initiative must be checked by effective managerial controls for measuring compliance with policies and instructions. By isolating exceptional cases for the attention of superiors, managerial time is saved for planning and organizing.

---

[20] "Any change in conditions which permanently increases or decreases efficiency over fifteen points from the 100% mark warrants a change in incentive rate." L. P. Alford and J. R. Bangs, *Production Handbook* (New York: Ronald Press Company, 1948), p. 1932.

There are other management principles in the making, based largely on a growing relation between applied economics and management, a trend which is evidenced by an expanding literature cutting across the two fields. The growth of cooperative plans in both buying and selling is one influence of economics on management. The separation of ownership and management in medium-sized and large concerns is an almost completed shift which requires new principles for its control. The mutual rights and obligations created when financial interests other than risk capital dominate both owners and management are not currently guided by any principle of management. Finally, to what extent are new principles of management required for controlling the new business bureaucracies for the mutual interests of the employees, the owners, the general public and management?

QUESTIONS

1. What are the chief functions of management?
2. What is the essential difference between a law and a principle in the field of management?
3. Discuss the place of intangible factors in scientific research.
4. Why is unity of command referred to as an organizational principle of management?
5. How can unity of command be maintained when two or three persons appear to have an equal amount of authority?
6. What are the three types of control relationships which a superior must maintain over his subordinates?
7. What principle or rule of management was developed by Graicunas?
8. What is the relation between delegation and the exception principle?
9. What management principle provides for the grouping of similar or closely related duties?
10. To what extent should action be planned?
11. What is the relationship between leadership and policy-making?
12. What type of authority is assigned to the staff?
13. What is a chief source of lack of balance in management?
14. How can management maintain a proper relation between responsibility and authority?
15. How can delegation promote the development of subexecutives?
16. What is the relation of standards to managerial control?
17. How has specialization reduced unit costs in various lines?
18. Why is simplification easier to achieve in smaller concerns?
19. Why do assigned tasks promote better performance?
20. Under what circumstances is it advisable to revise standards?

CASE PROBLEM

Fulmer Benson, Inc.

Fulmer Benson, Inc., was started as a proprietorship about forty years ago, and incorporated under the name of the founder by his son, shortly after the father's death. Fulmer, Jr., has always worked for the company of which he is now, at 53, president. His mother has a life interest in 75 per cent of the common stock of the corporation.

The company manufactures wood cabinets, tables and shelving of all kinds. During the forty years of the founder's management, there was a slow growth, with emphasis on quality merchandise. The father built his business methodically, with a high degree of personal supervision and coordination. He held a tight rein on all phases of the business until a month before his death, at which time the concern employed 125 experienced wood-workers.

There was a fixed policy not to increase sales beyond the volume reached five years before, and in keeping with this rule new business was frequently turned down. It was his custom in later years for Mr. Benson to drop old customers who did not pay him within thirty days of the invoice date, and to require advance payment of 50 per cent with the order from the new accounts that replaced them. There was a loyal group of employees, half of whom had worked for Mr. Benson for more than fifteen years. They considered him hard-boiled, but they felt that this defect was more than compensated for by their steady employment and the pleasure they derived from making high-quality merchandise on a more or less craft basis.

There was no union under the proprietorship. The "Old Man" made it clear that he would close the shop and sell the equipment at auction if his employees gave any encouragement to union organizers, and his men felt that he not only meant what he said but was financially able to carry out his plan. At the same time, a large nucleus of the old-timers sympathized with his point of view, and a large majority enjoyed the establishment as a place to work. Hiring was not much of a problem; it was done on a hunch basis by Mr. Benson. There was no form of welfare organization, but Mrs. Benson was a committee of one who looked after all employee illnesses and other misfortunes. The Bensons had a fixed policy that "charity begins and ends in the plant."

During the thirty-one years after his graduation from a small liberal arts college, Junior Benson was indoctrinated with all his father's policies. The father decided that the son could learn about business on the job from a teacher who had been very successful. Junior's mother concurred in every pronouncement made by the head of the family. The new president had three daughters, the youngest of whom was still in college. The real training of the heir-apparent consisted of observation and attention to lectures on the "tried principles." He first learned to be a journeyman cabinet-maker. After ten years as superintendent of production, he was shifted to the office where he had charge, always subject to his father's supervision.

With a free rein, and his mother's encouragement as the controlling stockholder after the incorporation, Fulmer Junior decided to expand the business and reorganize it along more scientific lines. To take care of the financing of a new plant and equipment, it was necessary to raise additional capital. The business was capitalized for $500,000, of which $400,000 is common stock and $100,000 five-per-cent preferred. All of the preferred and $100,000 of the common is being held as treasury stock. The $300,000 of issued common represents capitalization at 10 per cent of the average annual earnings of $30,000 for the past five years — prior to the incorporation. Of the $300,000, Mrs. Benson holds $225,000 as a life interest under her husband's will, and the son owns the other $75,000 of the common stock.

Expansion plans were carefully laid by first offering the treasury stock in blocks of one share of common (par $100) and one share of preferred (par $100) for $225 each, the extra $25 per block to be added to the surplus account. Half of the treasury stock was offered to employees who had worked for the company for ten or more years, at par, and was promptly taken up. It was decided that the public offering would be deferred until the new corporation was showing a respectable profit. With the cash on hand, the new building was erected, the move made, and the old plant sold for $150,000, exclusive of the machinery and equipment. The new building cost about $300,000, and the new equipment, $200,000. The company had an accumulated cash account amounting to $65,000, which it was felt would be required for working capital. A blanket mortgage on the new plant and its machinery was placed for $250,000 at 5 per cent interest, with the option of reducing the principal at any time in installments of $5000.

The number of employees was increased to 215 immediately. To prepare for the planned expansion to 350 workers in the following year, Mr. Benson assembled an executive group consisting of an accountant who also acted as treasurer, a new plant superintendent, a director of sales, a personnel director and a purchasing agent. The new treasurer, the superintendent and one of the older employees were elected to the board of directors.

The president managed the business along the lines laid down so successfully by his father. His delegations of responsibility were all oral and private, and it was explained that an organization chart was unnecessary because of the comparatively small size of the business, which anticipated an annual volume of about $2,000,000. The plant superintendent had charge of production, assisted by a daily conference with the president to decide distribution of production and other details. The purchasing agent bought everything except lumber, which was taken care of by the president. New customer credits were passed on by the president, otherwise the director of sales had control of his activity. The expanded line includes some cheap furniture which is being made on a production basis. The sales director has gathered some furniture ideas on the road, but they have been opposed by Mr. Benson for the most part.

The first six months of operation in the new plant shows a loss of about $8400, which is a new experience for the company. The treasurer explains the situation as normal under the circumstances, but the president disagrees with unusual vigor about both the financial statement and the reasons for it. He orders the plant closed for three days for a thorough inventory-taking under his personal supervision. The new inventory shows substantially the same results as the one taken under supervision of the superintendent.

About this same time, union organizers start a campaign of soliciting membership outside the plant after closing time. Mr. Benson has an idea that if the new superintendent did not actually encourage this move, at least he did nothing to prevent it, and tells him so. The superintendent disclaims any part in the union's action, explaining that he resigned from the union a week before he came to work on the new job.

Mr. Benson decides on two meetings for "show-down discussions." The first meeting is with the new executive group and three of the oldest employees in point of service. The second is to be a special meeting of the board to take action on whatever developments might come from the first meeting.

At the first meeting, Mr. Benson did most of the talking until the treasurer asked permission to read a prepared statement giving his opinion as to the causes of the loss and a series of recommendations to correct the situation. One recommendation was the substitution of accounting controls for many of the president's personal decisions. He also urged the adoption of an over-all budget, a simplification of the new furniture line and the addition of some high-quality items to overcome and avoid the reckless competition of the low-priced field. He suggested further that a consulting firm be employed to develop an incentive-wage plan for the production workers, a suggestion which the president immediately opposed. Finally, the treasurer suggested that a policy manual be prepared for the guidance of the executive group.

The discussion developed into a free-for-all after the treasurer's report. The personnel director pointed out that worker morale had slipped since moving into the new plant. He recommended that a plant cafeteria be installed in unused space on the top floor, and that the president prepare a monthly letter to be sent to the homes of all employees. After all members of the executive group had participated, the treasurer threw a bombshell by offering to resign unless more management principles were adopted and recorded in a policy and procedural manual.

PROBLEM. What action would you take if you were president of Fulmer Benson, Inc.? What recommendation would you make to the subsequent meeting of the board of directors? Why is the operation of the new organization apparently floundering at cross-purposes after such effective financial planning for the expansion?

CHAPTER 5

The Management Team: Top and Middle Management

Top management, middle management, and foremen or supervisors make up the management team. At the top of the industrial management ladder are the chief executives and at the bottom, the foremen. High quality at both ends of the ladder is necessary for competent management, and it is often difficult to decide which job is the more important contributor to productivity.

A mediocre executive with top-grade foremen is more likely to obtain high productivity and high quality in the goods produced than a top-grade executive with mediocre foremen. But this observation is largely academic, because a top-grade executive will *have* good foremen, either through proper selection or training, or both. Furthermore, top-grade foremen will not serve mediocre executives for any extended period. Like begets like in this field as in most others. All classes of management, including foremen and the lower echelons of executives (middle management) want a leader in whom they have confidence. If the subordinates are first-rate, they can get jobs where they serve under managers who are leaders. That is true all down the management and employee lines. The observations made here regarding foremen in industry apply equally to the lowest line of management in any other kind of business.

Some experienced and thoughtful commentators believe that middle management is the backbone of the management team. Their contention is based on the fact that middle management is what its title signifies — in the middle. In that position it is claimed that it has more influence both ways than either of the other two member groups of the team.

Executive types

All members of the management team should have one characteristic in common — they should be leaders. When other things are equal, the success or failure of an enterprise hinges on the ability of the leader to influence all levels of the organization to work together as a team. There are, however, different types of leader, many of whom appear to obtain success from entirely different approaches. We must realize, too, that in some cases, executive success may seem more real than the facts justify. In still other cases, initial successes may be real, while close scrutiny reveals that the "leader" is on the downgrade.

Leadership may be classified in several ways. One criterion is the leader's receptiveness to new ideas. He may resist ideas, be receptive to them, or be actually eager for them. The first man's days of leadership are numbered, and for the last man there is always the danger that he will neglect his major functions while he wanders about in the maze of ideas and suggestions which he has inspired. There is no fixed prescription for the correct degree of receptiveness to new ideas. All three types of leader are conditioned by nature, experience and training, and many of them would not work to advantage in another's groove.

Alford and Beatty classify leaders into six types:

1. *Intellectual,* who gains followers through his recognized ability in specialized functional fields.
2. *Institutional,* who leads because of the prestige of his position (also referred to as "positional").
3. *Democratic,* who obtains follower loyalty by catering to the majority desires of his group.
4. *Autocratic,* who leads through domination and drive.
5. *Persuasive,* who engenders cooperation through a likeable personality.
6. *Creative,* who inspires others with ideas, and stimulates them to emulation.[1]

Probably no leader falls exclusively into any one category. The institutional leader, for example, may also be autocratic, just as the intellectual may be creative. Various combinations of traits produce distinct leadership qualities in different men. The combination of persuasive and democratic characteristics will have a high rank under present management conditions. It was generally recognized, during World War I, that Charles M. Schwab, then president of the Bethlehem Steel Company, could increase productivity, at least for a time, by speaking to and then mingling with the workers in any one of the government's shipyards. His trait combination from the categories listed above would include the democratic and the persuasive.

The institutional type of leader is slowly losing ground. What leadership he possesses is based on the idea that his positional authority alone leads to correct decisions, which should then be followed. His authority derives from his position or title. This questionable basis for leadership still finds wide acceptance among military officers, where rank is often the final arbiter. But obviously, facts rather than rank are the basis for correct decisions. One of the regional offices of the War Board displayed this large wall motto: *One cannot dispute about facts; he can only be ignorant of them.*

---

[1] L. P. Alford and H. R. Beatty, *Principles of Industrial Management* (Rev. ed.; New York: The Ronald Press Company, 1951), pp. 111–114.

Top-executive duties

From an over-all standpoint, the executive is responsible for coordination and profits. Under present competitive conditions, he cannot obtain profits for his company without rendering acceptable service to its customers, and service results from coordination of the concern's activities. An equally important objective of the executive is recognition of his concern's social responsibilities to the community, the general public and company employees. Without adequate attention to all of these fundamental duties, no executive can hope to be successful in the modern world of business.

Dr. Donald K. David of the Harvard Graduate School of Business Administration has listed three categories of paramount executive responsibility.[2] The first is "the competent operation of a business unit." The second is "the operation of that business unit in such a way that it is a good place to work." And the third responsibility is "constructive participation in the broader affairs of the community and nation." These three fundamentals are merely different ways of stating the thoughts outlined in the preceding paragraph. "Competent operation" means operation at a profit, "a good place to work" means a proper consideration for employees, and all students in the field of management agree that participation in community and national affairs ranks high among the obligations of the business leader.

From a technical standpoint, the broad management duties of the top executives are five: to plan, organize, direct, coordinate and control. Properly executed, these technical duties will produce profits and customer satisfaction. The less formal obligations already discussed assure the company's growth and expanding opportunities for service. Without them success may be transitory, and measured chiefly by interim profits which can result from a fortuitous combination of adequate management techniques and favorable circumstances.

It is difficult to list the five technical duties, or functions, in the order of their importance. Lack of attention to any one of them, even when the other four are expertly handled, can break down the whole scheme of leadership.

These five functions were mentioned briefly in Chapter 2,[3] where they were used to describe the chief things that had to be done by any manager. Each of these functions can also be thought of as the focus for a set of managerial techniques. Around each of them, there has grown up a body of rules and procedures which guide management in the performance of these essential duties.

Planning. The superior executive will not only be constantly aware of the wisdom of planning all action, but will also be familiar with the best techniques of planning. By management controls he can measure the present situation, but only by proper planning procedures can he provide reliable

[2] "Human Relations and Productivity," *Systems Magazine,* Vol. 16 (May 1952), pp. 5–6.

[3] See pages 23–24.

guidance for the future. Most plans are guides rather than inflexible courses of action; plans should be flexible enough to be adjusted to any changes in the circumstances which originally gave rise to them.

Because the specific techniques of planning under scientific management are described throughout the book, especially in Chapter 15 on Planning, no attempt will be made here to outline all the technical details. In all the chapters devoted to specific activities — financial management, budgetary control, maintenance, material handling, to name only a few — the importance of planning in general and of knowing the proper planning techniques for each activity will become more apparent.

Organizing. The next important focus for the exercise of managerial techniques is the building up of the organizational structure. The whole of Chapter 8 is devoted to these techniques. Here we shall only point out that management's attention to the organizing function must extend beyond the formal structure as represented by an organization chart. The chart establishes functional relationships throughout the organization. It may range all the way from very poor to excellent and must be judged largely by the results it produces. But whether it is good or bad — and however necessary such a chart may be — there is always an implicit tendency toward managerial rigidity in the structure it sets up. Therefore, the smooth-running concern will often have an informal executive clique which operates chiefly through its social contacts. This "kitchen cabinet" makes for harmonious operation of the formal organization. It can arrive at unofficial decisions in an atmosphere of mutual give-and-take. It is not chained down to the formal managerial plan but represents the executives' unfettered thinking.

Directing. The third focus of managerial techniques is the actual directing of operations, once these have been planned and organized. Direction is based primarily on the positional authority of the executive group. That authority confers the right to command and to direct operations. The executive who does not exercise his official right to command is likely to lose that right to some natural leader of the group who may take over unofficially with the general consent of his subordinates. The exercise of authority requires a nice discrimination on the part of the executive. When authority is used laxly, it will be lost by default; and at the other extreme, authority may be lost through overuse because of a tendency to rebel against it by the other members of the management team.

The right to command is best exercised by suggestion rather than by an order demanding compliance, although the right to command includes the *obligation* to secure obedience. It entails the further obligations of making orders understandable and of assuring that the person to whom they are directed is capable of carrying them out. Some orders are so detailed that they leave no opportunity for the exercise of initiative. Others, more or less general in nature, are used to promote initiative. Orders of the latter type also test the recipient's willingness to assume responsibility; to the extent that they are successfully carried out, they also foster leadership qualities in the subordinate.

Coordinating. The fourth functional focus for the exercise of managerial techniques is coordination. This is the drawing together in proper sequence and balance of all the activities and forces that go to make up the organization. Its formal basis is found in the right to command, and its informal or psychological basis derives from the necessity for group cooperation. Coordination is apart from the other four functions of management in that it aims to make these others work together. For this reason, coordination may be thought of as the *primus inter pares* of managerial duties. Indeed, management is sometimes defined as the "intangible coordinator of activities."

Coordination, even under ideal conditions of individual and group cooperation, requires a high degree of analytical skill, a keen sensitivity to changes of all kinds, both human and material. Therefore, flexibility is always a prerequisite of good coordinative techniques.

Controlling. Finally come the techniques of control, which measure results against planned objectives. There are numerous methods of control, which must be adapted to the activities, objectives or personnel to which the controls are applied. These methods and techniques will be dealt with at length in Chapter 9 on Managerial Control and again in Chapter 16 on Planning Controls.

Controls may be thought of as indicators of situations requiring managerial attention. They almost invariably involve paper work of some kind. They are records which point out trouble spots. When a record shows that a situation is out of control, this does not mean that the person with organizational responsibility for the unsatisfactory situation has himself caused it. The trouble may have been due to factors beyond his personal control. What it does mean is that the executive must act as troubleshooter until the situation is under control once again.

The exercise of control may result in reprimand or better instructions for the subordinate, or it may call for executive assistance in correcting the uncontrolled factor in the subordinate's task. That factor may be any of a number of things, such as inadequate machines or tools, improper materials, or insufficient skill on the part of the worker. The executive who is operating with adequate controls can direct his attention to correcting situations where operations are not in line with standards set for them. Controls are also indicators of standard, or favorable, situations which the executive can ignore, unless it is to give praise where praise is due.

Two of the techniques of command and control which deserve special comment are *disciplining* and *discipline.* There is a significant distinction between the two. "Disciplining," or disciplinary action, has to do with the sanctions or punishments for infractions of the established rules.

"Discipline" refers to that attitude of a person or a group which creates and maintains a desire to follow the rules established for guidance. Discipline is important in all organizations. It is inculcated through indoctrination. The aim of such indoctrination is to evoke the personal desire for team action through adherence to the rules of the game. In the military, discipline saves lives; in industry, it promotes productivity; in all types of organization, it is necessary for smooth-flowing operations.

Finally, *morale* is that pervading attitude in any organization which results from discipline. It might be said that whereas discipline indicates adherence to the rules, morale indicates a voluntary and spontaneous acceptance of them. We shall explore the concept of morale more fully in Chapter 21 on Personnel Relations.

Top-executive situations

Leadership types are also influenced by the circumstances or situations in which they are called on to operate. If a particular type of leader is not able to function normally under the conditions of the operation or environment in which he finds himself, he will likely fail unless he is flexible enough to adjust to it. For example, the executive in the small firm must deal with problems of detail, while in the large company his problems are primarily matters of policy. A flour mill has a relatively simple and steady production process, while a manufacturer of electric parts may have several thousand items in his line, with constant changes dictated by customer demand. Naturally, the executive force of the latter concern must be much more flexible than the chief of the flour mill. The top executive of the electrical parts company would have the over-all responsibility of maintaining a proper balance among a great many production, material, human and other factors.

Manufacturing and other concerns catering to style demands have a genuine problem in that the type of executive talent may determine the success or failure of the enterprise. After twenty years' experience with a large security brokerage concern, its chief executive contended that although he felt naturally fitted for the quick-decision nature of the business, his diminished supply of the requisite flexibility suggested a change to a "less strenuous" position. One cannot help questioning the broker's assurance that he was "naturally fitted" for making quick decisions. An executive normally thrives on the type of job for which nature has fitted him.

Some executive positions place a premium on impersonal technical skills, while the focus of others is on the human-relations skills necessary to direct the efforts of men in action. Some executives are of the deliberate type while others are quick and aggressive. If the executive is to exploit his own individual talents to the utmost and be of highest service to the concern which he serves, his personality type must be suited to the particular managerial situation.

Top-executive qualities

We emphasize again that the top quality of the executive is leadership, but that intangible needs clarification. Leadership qualities are elusive and difficult to define. They are something that is felt by subordinates and observed by others in the actions of the executive. Many writers have listed and explained leadership qualities in different ways, and from different points of view. Perhaps no general formula for leadership is possible, because there are many different fields using competent executives. Albert Einstein, Charles Steinmetz, Thorstein Veblen, Charles Lamb, and even Babe Ruth exemplify leadership, but in widely divergent fields. It is doubtful whether any of them would make a good business leader.

In the general field of business, the management pattern is changing, making it necessary for the competent executive to adjust his actions and techniques accordingly. The executive of twenty-five years ago would be unhappy and probably unsuccessful in today's business environment. Organized labor is one outstanding reason for this change, because of its encroachment on the prerogatives of management. Some of the men mentioned above established their leadership by intellectual ability alone. This is not enough in business management. The personality which gets things done through the cooperative efforts of others is much more important.

An outstanding article on the qualifications of the executive lists the following personal characteristics as indispensable:

> He is dynamic. He is competent. He is adaptable.
> He has a strong sense of personal responsibility.
> He earns the following of the people he leads.
> He has a strong feeling for people.
> He has standards of personal conduct and business morale.[4]

In addition to such personal qualities, the executive must not only have a general understanding of the rules of successful business, but he must also know about production, marketing, finance, sales, purchasing, personnel and other functions of business. He must have some knowledge of organization, the routing, scheduling and dispatching of work, and how to select and train subordinates. These are skills which the executive must learn and develop.

Competent executives must have the following qualities:

1. The intellectual capacity to solve problems, and the health to support sustained mental effort

---

[4] "What It Takes to be a Good Leader," *Modern Industry,* Vol. 17 (April 15, 1949), p. 67. Another list of top-executive qualifications is from *Business and the Man,* by the late Dr. Joseph F. Johnson, founder and first president of the Alexander Hamilton Institute, quoted in L. P. Alford and John R. Bangs, *Production Handbook* (New York: The Ronald Press Company, 1948), p. 39. This list includes: courage, energy, initiative, independence, high ideals, responsibility, creative power, executive ability, honor and integrity.

2. The ability to plan and organize on a broad base and in a far-seeing manner
3. The rational vision to make correct decisions in most cases
4. The capacity and willingness to assume responsibilities
5. The knack of convincing and stimulating others

For the fulfillment of such qualifications, the executive will find that personality, common sense, and pleasure in his work are indispensable.

Top-executive actions

In translating his required qualities into action, the executive is guided by the following procedures. The good executive:

1. *Gives attention to broad problems,* leaving the minor ones to subordinates
2. *Delegates assignable duties,* thus adding to his own usefulness and accomplishments
3. *Schedules his time* so that a balanced work-day includes opportunities for consulting with subordinates, and for planning and organizing
4. *Controls the activities* of his company so he will know whether standards are being met, and if they are not, the reasons for failure
5. *Visualizes the results* of a course of action
6. *Invites suggestions* to improve activities, methods and plans, and to stimulate the loyalty of participation
7. *Discusses ideas* and future plans with his associates
8. *Consults with outside specialists* on technical matters in which none of his staff members specializes
9. *Makes decisions* on the basis of facts rather than hunches
10. *Follows decisions with action*
11. *Honors traditions* while remaining open to new ideas
12. *Respects the value of principles* and the flexibility of methods
13. *Communicates decisions* and future plans to subordinates
14. *Praises liberally* and censures constructively
15. *Confers with his peers* critically, and his subordinates sympathetically
16. *Trains understudies,* and insists that his staff members do likewise

Executive selection

There are two chief sources for selecting executive talent. One is from inside the organization, by promotion, and the other is from the outside. The executive group will usually have reliable information about the experience and qualifications of a candidate who is to be promoted from within the organization. However, since the successful candidate will be assuming duties of a new type, it is not illogical to obtain additional information akin to that sought about a person being hired from the outside. The extent to which such an investigation should be pursued depends on the candidate's length of service and his record.

Hiring an executive from the outside is like buying a fully automatic machine. Both must be capable of functioning by themselves, and both are large investments. Over a ten- to twenty-year period the investment in the new executive will be many times that in the machine, yet in most cases more consideration is given to selecting the machine than to choosing the new executive. One reason is that men aspiring to the executive class have winning personalities which sell themselves; the machine has no such advantage.

Top executives are often hired on a purely competitive basis, especially when their performance records with some other concern are well known. In this case, the executive is sought out; he is not necessarily looking for a change. There is only one of his particular kind, and the negotiations will be limited to questions of salary and the opportunities offered by the new position.

Most executives, however, are not sought after as well-known individuals. They are rather factors on the executive market. The surprising thing, from a management standpoint, is that while the typical candidate is doing a good job of selling himself, the typical executive buyer is not doing a good job of purchasing. Both sides should be dealing at arm's length. The important things which the buyer should know are either hidden behind, or colored by the seller's personality screen. It is amazing how frequently little or no technical evaluation is made of just those qualities in the candidate's background which the prospective employer is seeking.

In view of the large contemplated investment in a new executive, his hiring should be based on factual data covering a wide range. If such exploratory methods are unknown or distasteful to the employer, he would be well advised to employ a professional consultant in that field. Through training and experience, consultants have learned how to get the information necessary for a valid conclusion. One commentator in this field has suggested the advisability of factual information covering family, education, hobbies, work experience, social and economic experiences, and health and religious associations. The same writer suggests that the candidate's experience and past behavior should be appraised by the following criteria: attitudes, motivation, maturity, emotional stability and aptitudes.[5] Each of these variables should be weighted according to its importance in the situation where the candidate will be called on to serve.

Appraising top executives

It has been customary in the past to apply service ratings only to those below the executive level. However, ratings are being developed and improved to apply to "key personnel," a class which includes the executive group. Such ratings, like those for line workers, are used to determine how well the individual is doing his job, and what action should be taken on the basis of the findings. Figure 5.1 is an excellent executive rating scale.

In this connection, graphic rating scales can be used to advantage, registering the degree to which key personnel measure up to desired

[5] J. H. McQuaig, "Hiring Executives," *Advanced Management*, Vol. 14 (December 1949), pp. 15–16.

FIGURE 5.1

Executive Rating Scale

EXECUTIVE RATING

Name ______________________ Date ______________________

Position ______________________ Time in present position ______________________

KNOWLEDGE OF JOB (Circle the square which best describes person being rated.)

RESPONSIBILITIES AND DUTIES	Thoroughly Understood	Generally Understood	Fairly Clear	Confused
COMPANY POLICY AND PROCEDURES AFFECTING WORK	Complete	Good	Sketchy	Insufficient
DETAILS	Complete	Good	Sketchy	Insufficient
NEW DEVELOPMENTS IN FIELD	Thoroughly Informed	Well Informed	Fairly Well Informed	Inadequate

PERFORMANCE ON JOB

ORGANIZATION AND PLANNING	Can Always Plan Work Independently and Expertly	Can Usually Plan Routine and New Work	Can Only Plan Routine Work	Cannot Plan Logically
JUDGMENT	Excellent—Can Trust with Major Decisions	Decisions Generally Show Clear Thinking	Can Be Trusted with Minor Decisions Only	All Decisions Have To Be Checked
IMAGINATION—CONSTRUCTIVE THINKING	Consistently Excellent Ideas	Good Practical Ideas	Some Original Ideas—Not Always Good	No Imagination
PRESENTATION OF IDEAS AND PLANS	Excels in Making Plans Effective	Generally Able To "Put Plans Across"	Average Ability in "Selling" Plans	Cannot Put Ideas Across
DELEGATION OF WORK	Successfully Delegates Responsibilities and Authority	Generally Assigns Duties Fairly and Intelligently	Has Trouble in Assigning Work	Tries To Do Everything Himself
EMOTIONAL STABILITY	Always Objective—Has Complete Self-control	Maintains Good Balance	Fair—"Blows Up" Occasionally	Over-sensitive—Cannot "Take" Criticism
ACCEPTANCE OF RESPONSIBILITY	Accepts Full Responsibility—Welcomes New Duties	Generally Stands His Ground—Accepts New Responsibilities	Tendency to "Pass the Buck" and Avoid New Responsibilities	Shies Away From Responsibility
RELIABILITY AND FRANKNESS	Wholly Reliable—Will Follow Plans, Admit Errors	Generally Reliable and Frank	Not Always Frank	Cannot Be Depended Upon
COOPERATIVENESS	Always Helpful and Cooperative	Will Generally Cooperate	Doesn't Always Try To See Other Point of View	Stubborn—Not Cooperative
EFFECT OF PERSONAL AND FAMILY LIFE	No Harmful Effects on Work	Rarely Interferes with Work	Occasional and Slightly Adverse Effect	Continually Bad—Serious Effect

What are his outstanding abilities? ______________________

What are his principal points for improvement? ______________________

Recommendations for improvement? ______________________

Is his performance generally improving . . . remaining the same . . . or deteriorating? ______________________

Is he promotable? ____________ To what? ____________ When? ____________

SUMMARY RATING—(Circle appropriate grade. Use above information in developing grade.)

1. **EXCELLENT** + −
2. **GOOD** + −
3. **AVERAGE** + −
4. **POOR** + −
5. **FAILING** + −

Rater's Signature ______________________

Reviewer's Signature ______________________ qualifications. Here, as with most ratings, the big problem is to decide on the factors to be rated. One qualified source suggests the following questions for determining over-all key personnel ratings.[6]

1. Does he organize, plan and delegate his work?
2. Does he learn new methods and procedures?
3. Does he assume responsibility in keeping with good judgment?
4. Is he thorough and reliable in work performance? Does he get results?
5. What is his attitude toward the job and the organization?
6. Does he identify good subordinates, and train and develop them for increasing responsibility?
7. Does he cooperate with and obtain the cooperation of those above and below him?
8. Does he make decisions?
9. Does he analyze data critically and give proper emphasis to each factor?
10. Does he use imagination? visualize future possibilities?

Top-executive failures

An inflated feeling of authority is one of the major pitfalls of top management. Kingston aptly expressed the idea when he wrote that "nothing more impairs authority than a too frequent or indiscreet use of it. If thunder itself were to be continual, it would excite no more terror than the noise of a mill." Nothing entrenches an executive so thoroughly in an ivory tower, beyond the reach of suggestions and of truth itself, as an exaggerated opinion of the importance of his official position. Such aloofness leads to many management failures. Basic errors of judgment and action are apparent when the executive:

1. Cuts across established channels and ignores accepted procedures because he does not understand organization
2. Confuses flexibility with lack of procedures and policies because he wants others to believe he knows all the answers
3. Keeps aloof from the rank and file, hoping to build an impervious wall of respect about himself
4. Dislikes people, so does not get along with them
5. Fails to visualize the future because he is enmeshed in details of the present, and hence is frequently amazed at the normal consequences of his actions
6. Fails to coordinate activities because he cannot comprehend their relationships
7. Creates the feeling among subordinates that he cannot be trusted; true or not, results are the same
8. Resents suggestions out of established routine, causing him to make snap judgments or procrastinate
9. Does not delegate responsibility because he enjoys having his subordinates

---

[6] "The Technique of Rating Key Personnel," a report prepared by a committee of the Twin City chapter of the Society for the Advancement of Management, published in *Modern Management,* Vol. 8 (August 1948), pp. 4–6.

come to him with their problems as if they were trying to "stump the expert"

10. Does not understand control procedures, and so has only a haphazard check on accomplishments
11. Hears only good news from subordinates because they know his mind is closed to the truth
12. Makes improper decisions on incomplete data simply because there are some data
13. Settles unfamiliar proposals by deciding that they cannot be done

Conclusions

By and large, executive positions have not been analyzed nearly so well as those of the workers. Therefore, the qualifications needed for particular executive jobs are unknown, indefinite or untrustworthy. To the extent that this is true, a proper selection is purely accidental. In addition to our failure to analyze the technical qualifications required for particular executive jobs, we have made even less progress in finding out before hiring whether or not the candidates possess leadership qualities. Social and psychological attributes of the candidate are given still less attention. The wonder is that the results are as good as they are.

An editorial in *Modern Management* offers a clue to this situation:

> Numerous young men who have been trained in modern management methods have been side-stepped on the organization chart to make room for retired generals who had pull, or for relatives, who couldn't make a go of it elsewhere. Bankers, lawyers, economists, and others, with less management training than T.W.I. gave to a screw-machine operator during the war, are rapidly finding their way to top management jobs, while men with years of training are asked to break them in.[7]

Middle Management

Middle management, the group responsible for operational detail, is typically made up of plant superintendents, production managers, branch sales managers, heads of departments within the personnel, finance and other main functional divisions, and those in charge of such service activities as maintenance.[8] Middle management claims that it carries the main burden of seeing that things get done. The same claim is made by foremen, who argue that they are the management link closest to the workers and therefore most responsible for actual accomplishments. As a matter of fact, both of these groups are "in the middle." Middle management must answer to top management for the performance records of the foremen.

---

[7] Don F. Copell, "Management Muses," *Modern Management,* Vol. 7 (October 1947), pp. 1–2.

[8] The executives responsible for the chief functional divisions — personnel, finance, etc. — fall in the top-management bracket. When the president of a corporation helps the board of directors determine policies, he receives many of his suggestions from the heads of the functional divisions. In effect, they make up the president's cabinet and, for this reason, fall logically within the category of top management.

Middle management has sometimes been divided into two or more subgroups.[9] However, such distinctions are becoming less valid with the current tendency toward joint thinking and planning by top and middle management. Traditionally, there has been a separating wall between the two groups. This wall has left the middle manager in a state of bewilderment, trying to guess what the top executives really think about his methods and his results. Because the detrimental effect of such bewilderment on middle management is coming to be more widely recognized, a new policy of drawing the middle group closer to the top is gaining ground. More and more, middle management is able to hear what top executives are thinking and see how they function. And so, instead of middle management's breaking up into distinct subgroups, recent practice has tended to blur the line between top and middle management.

It should be understood that this growing partnership refers particularly to planning, organizing and controlling rather than to operations, although the new "consultative management" also deals jointly in an advisory manner with the methods and techniques of operations. The general idea is to promote better decisions and coordination through joint discussions between these two groups. The multiple-management idea also lies within this new conception of the role of middle management, in spite of the fact that the Junior Board has only suggestive authority — the so-called authority of ideas.[10] One of its purposes is to get the lower echelons of management and workers closer to top management.

Besides promoting better understanding between the two groups, this new communion is helping to emphasize the understudy idea, by which the members of top management give their junior partners an opportunity to sit with them and observe them in action. Past practice among the rule-of-thumb executives was to keep secret their *modus operandi,* believing that they thereby preserved a halo of mystery about their actions with which to impress subordinates. Knowledge of the *modus operandi* was confined to the sons of the bosses who were slated to succeed them. But as the word spread that there really were no traditional secrets of management, the halo gradually disappeared from these top executives, and the objective understudy idea was born.

Middle-management duties

Middle-management functions are generally understood to include:

1. Supervising operations of the assigned department or section, subject to announced policies and regulations of top management.

---

[9] See, for example, Alford and Beatty, *op. cit.,* p. 89, where five "activity levels" of industrial management are distinguished: Top Management, Upper Middle Management, Middle Management, Foremen, and Operating Force.

[10] See page 150 for a discussion of the Junior Board.

2. Exercising controls based on approved self-established standards, or on those received from top management or an immediate superior.
3. Making reports to, and receiving instructions from, immediate superiors — a member of top management.
4. Making final decisions on the employment of immediate subordinates, with general control supervision over their training.
5. Providing the necessary records for reporting quantity, quality, and other data of operations being supervised, and seeing that they are used effectively by their responsible subordinates.
6. Making regular reports to a superior, summarizing recorded information received from subordinates. These reports should contain comparative data of previous periods, together with substantiated explanations and recommendations.
7. Making special reports to their superiors as called for.
8. Cooperating with other members of middle management for the purpose of effecting a smoothly operating organization.
9. Coordinating assigned operations with other activities of the organization.
10. Promoting good discipline and morale among the workers they supervise.
11. Teaching one or more understudies the operation of their assigned function, as well as the concepts which make up leadership.

Middle-management qualifications

The members of middle management should have the same type of qualifications, but to a lesser degree, as those expected of top management. It is assumed that some members of middle management will be qualified eventually for promotion to top-management rank. Those members who do not possess the innate qualifications for advancement are not properly placed in the middle-management group. It is further assumed that the members of this group are capable of rising, after understudy experience with the members of top management, to a level where they can assume responsibility for over-all planning, organizing and policy-making.

Checks can be made on the general conduct and managerial effectiveness of the middle-management members in several ways. The accomplishments shown on their regular and special reports to superiors provide both quantitative and qualitative indices of their performance as managers and trainers. Within limits, the labor turnover in the areas under their supervision is a measure of their skill in selecting subordinates. Comparison of data on current reports with previous showings, as well as comparisons with predecessors on the same job, are also criteria for judgment of successful performance. A survey of morale among middle management's subordinates offers another measure of managerial competence.

Although middle management does not experience the volume or intensity of strain with its subordinates that the foreman has with his workers, nevertheless many members of middle management have in their relations with top executives a taut feeling that foremen do not feel in dealing with their middle-management superiors. This middle-management relationship with top management is gradually being relieved in the better managed companies where the dividing walls are being lowered by a leveling up of participation by the middle-management group.

QUESTIONS

1. Why is it that high-grade executives usually have competent foremen?
2. How would you classify leadership with respect to its receptiveness toward new ideas?
3. Why is it that the institutional type of leader is losing caste in modern business?
4. What type of leadership would you recommend for directing a research laboratory?
5. Give two or three examples of the proper relationship of leader types to specific lines of business.
6. What are the five broad duties of top management? Explain their application to executive responsibility.
7. What is the difference between discipline and disciplinary action?
8. Mention some of the outstanding qualifications of the competent executive.
9. What are some of the procedures by which the executive exercises his qualifications in action?
10. Outline a broad plan for the selection of executives.
11. How can top-executive action be appraised?
12. Mention a few of the causes for executive failures.
13. What typical activities are exercised by middle management?
14. What changing relationship is developing between top and middle management?

CASE PROBLEM

The National Road Machinery Company

The National Road Machinery Company was founded in 1900 by Morgan Lewis after he had served a similar concern in various capacities for about twenty years. Owing to his last ten years' experience as general superintendent with his former employer, Mr. Lewis attracted such a wide following among road builders that National was a large concern by 1920 when its founder reached his sixtieth birthday. A general line of road machinery was being sold to city and state governments as well as private contractors, but emphasis was gradually shifted to gasoline-driven scrapers and rollers. Specialization enabled the company to compete more easily and increased its business accordingly.

The "boss" mastered the principles of engineering and management by correspondence in his earlier days and practiced them constantly on the job. As a production man, he spent most of his time in the plants, even after the business became large. He knew all his key shop men and made it a practice to speak to everyone. When he saw a strange face, he made a special effort to make the worker feel at home and invariably asked him for suggestions to improve operations.

His courage in making radical mechanical improvements in the road equipment was recognized by the superintendents, and his energy was admired by most of his workers. The "boss" was distinctly the democratic and persuasive type. His search for ideas extended to members of the board, which encouraged them to accompany him on plant tours after their meetings. Above all, he seemed to be an inspirational leader by nature, and it was easy to see that he thoroughly enjoyed his job and its environment.

The shops were always equipped with modern machinery. Mr. Lewis had a philosophy that high-priced equipment and highly paid workers assured him the cream of the crop in both categories. He delighted in making it clear to all employees that they did not need to fear competition with such a combination. He expounded similar ideas in the company magazine from time to time over his signature.

When his sixtieth birthday was celebrated by an all-day country picnic, his two sons had been part of the organization for about ten years. Their education was obtained on the day shift, but they were not spared the rigors of plant experience. Neither was mechanically inclined, nor was it necessary that he should be. A general business education would normally be as valuable to the concern as engineering training, especially since the engineering problems were improving rather than building from the bottom.

The "boys" were likable enough, but in a different way from their father. They didn't make many mistakes for the simple reason that they found it easier to go along. They also felt some resentment at what they considered was an unjustifiable attitude on the part of many supervisory employees. Their outside social interests had helped to keep their shop interests on an objective basis.

When Mr. Lewis was forced to retire and move to another part of the country because of his health, he selected a retired Army officer as president of the concern. He was influenced to this move chiefly because of the officer's wide experience with military procurement. It was Mr. Lewis' idea that sales would likely be the weak point of National's business and that his sons would be better fitted for looking after the production processes. This, he felt, would be a perfect top-management combination. The general's thirty years' experience gave him easy entree to military buyers, while the boys had a thorough knowledge of production. The general should be president because of his age and the possibility of his stabilizing influence if friction developed between the two brothers.

As occasionally happens, a strong man makes his weakest decision toward the end of his business career. By the end of the first year under the new arrangement, the sons were agreed that the general's wings must be clipped, and the newly organized union felt the same way.

PROBLEM. From the consideration of executive qualities and the causes for its failures presented in this chapter, how would you explain National's loss of leadership in an industrial field? Two of the big questions are the new president's ability as an industrial leader, and his relations with middle management. What characteristics do you feel that the new president must cultivate, and how could he go about it? If you were in the general's position, what would you do to secure the active cooperation of the two brothers? And if you were one of the brothers, what steps would you take to restore harmonious operations between top and middle management, with the idea of restoring National to its leadership in its field?

CHAPTER 6

The Management Team: The Foreman

Many executives who have come up through the ranks feel that the foreman holds the key position for maintaining operations in smooth working order. This appraisal holds for similarly placed subordinates in all lines of business.[1] Whereas middle management has top management on one side and foremen on the other, the foreman is between his men and all the other layers of management. A further distinction between middle management and the supervisor or foreman, as members of the team, is the big difference in their status. In some cases, even today, the foreman is scarcely included on the management team, except through lip service.

Until the Taft-Hartley Act (1947) placed the foreman legally in the management group, the workers' opinion of their foremen ran something like this: "Some foremen are O.K., especially those who have been on the job for a long time, but most of them have swelled heads and don't know as much about their jobs as some of their men. They play favorites and throw themselves around like big shots, but they are afraid to tell the real big shots what's wrong with the place, and how the workers should be treated. They grab credit for good ideas and pass the buck to their men for the things that go wrong."

On the other hand, the foreman's idea of his own status runs something like this: "He's the man who takes orders from everyone else in management about how to do things, and how to get the workers to produce. No matter how impossible the orders from above, the foreman is supposed to carry on and report favorable results. At the same time, he is supposed to talk the workers out of all their gripes, and not let any complaints get to upper management. He never does enough, and gets the blame for everything that goes wrong below and above his job level. Government regulations are always making his job tougher. He works long hours for little more pay than his men, and sometimes he gets less because the workers are paid for overtime."

---

[1] The terms "foreman" and "supervisor" are used interchangeably in this text to refer to that level of mangement, in any kind of business, which has responsibility for direct supervision of the working force. Although the present chapter focuses on the strains in the industrial foreman's role, it should not be forgotten that "supervisors" in other businesses are subject to very similar problems.

Those two speeches have been made many times by typical foremen and their men. They represent the extreme views, of course, but at the same time they do describe situations as they exist in some plants.

The foreman's self-appraisal has notable support from outside authorities. Professor F. J. Roethlisberger of the Harvard Business School, for example, gives this opinion:

> There is little question of the importance of the foreman to the smooth running operation of any industrial organization. Not only for practical, efficient operation but also for healthy human relations his importance is universally acknowledged . . . . Here, *par excellence* is the "man in the middle." . . . Here is a man in the middle of the abstract and the concrete, in the middle of theory and practice, in the middle of good intentions and practical achievement, in the middle of the verbal and nonverbal worlds and in the middle of changing technology and time-honored customs. Here in essence is the man of the hour.[2]

Duties of the foreman

What does the foreman have to say about the things that are included in his daily task? The following answers were contributed by a group of some fifty foremen with average service records of more than fifteen years, from a dozen plants in Dayton, Ohio. They were participating in a series of discussions led by the author, under the auspices of the Dayton Foremen's Club.

Responsibilities to Management

1. Watch after the quality and quantity of production
2. Keep worker morale at a high level
3. Cooperate with the upper layers of management
4. Keep management informed of all plant conditions
5. Keep the costs of direct and indirect labor, materials and supplies within the budget allowances
6. Maintain safe working conditions in the shop
7. Be on the alert to suggest improved methods
8. Maintain good housekeeping in the department
9. Be loyal to management and its objectives
10. Maintain the necessary records and reports
11. Administer company policies correctly
12. Protect company property at all times
13. Guard the health of the workers
14. Make his personal conduct a model for his men

---

[2] From the Foreword to Abraham Zaleznik, *Foreman Training in a Growing Enterprise* (Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1951), p. v.

15. See that rules and regulations are observed
16. Keep down the amount of waste and scrap
17. Use special care in inducting new employees

Responsibilities to the Workers

1. Use the best methods for worker induction
2. Add a human touch to on-the-job training
3. Maintain safe working conditions
4. Promote cooperation and good will
5. See that workers are properly placed
6. Make honest merit ratings
7. Improve the efficiency of the workers
8. Maintain technical knowledge of the job
9. Keep the worker posted about his progress
10. Interpret company policies clearly and fairly
11. Set an example in his personal conduct
12. Keep workers informed on items other than policy
13. Treat the worker as an individual
14. Keep transfers and promotions on an objective basis
15. Maintain satisfactory working conditions
16. Encourage suggestions and give credit when due
17. Furnish inspiring leadership

These duties, as classified by experienced foremen, present a formidable task for any man who has been recently promoted from the bench.[3]

Foreman problems

Chief of the foreman's problems is the frustration which has resulted from "functionalizing" some of his past duties, and assigning them to service and staff departments. This loss of former responsibilities has weakened his authority at a time when he is being assigned new duties of a trying character. Prior to the general establishment of personnel departments, the foreman had the right to hire and fire. With the feeling on both sides that the worker owed his job to his foreman, who could fire him without interference, authority was relatively easy for the foreman to maintain.

The personnel function, combined with the rising power of organized labor, wiped out this unquestioned authority. Personnel is now making hiring suggestions for the foreman's approval or disapproval. Since the foreman is too busy to do recruiting, and because he knows nothing about the applicant except what the personnel department has told him, he approves. If he discharges a worker on "general principles," he has to defend his action before the union's grievance committee. The result is often a reversal of his decision by upper management, with consequent loss of face among his men. If, on the other hand, he appears to have good and definite reasons for his action, his decision may be reversed because of management's fear of union pressure, or "for the good of the company." The shrewd foreman soon learns to ask the personnel department to transfer the objectionable worker, rather than discharge him.

---

[3] In its "Basic Supervision Training Notes," the Glenn Martin Company lists supervisor duties under three classifications: those he may delegate, those he shares with others, and those which are his own responsibilities. See also "The Foreman's Place in Management," *Factory Management and Maintenance,* Vol. 108 (January 1950), pp. 140, 142; this is an excellent summary of the foreman's job, discussed from the standpoint of knowledge, responsibilities, authority, planning and leadership.

The foreman has been relieved of his former buying authority by the purchasing department. His ego, at least, was formerly boosted by his contacts with salesmen. Since it has now become customary to require passes issued by the personnel department for entrance of any outsider to a plant shop, salesman-foreman relations are restricted almost entirely to discussions in the offices of the purchasing department. Maintenance and repair work is done for the foreman by the maintenance department, which is sure that it knows more about his machines than he does. His materials, which the purchasing department buys on his requisition, but often without consulting him, are sent to his department by the material-handling section.

On the other hand the foreman must shoulder many new duties as a member of the management team. One group of new duties concerns legal regulations with which he must be familiar. The Business Management Service of the University of Illinois lists the following:

1. State employer's liability and compensations acts
2. Unemployment insurance acts
3. The Federal Security Act
4. State old-age assistance and pension acts
5. Fair Labor Standards Act and state wage acts
6. Acts governing the employment of females and minors
7. Factory inspection acts
8. Fair employment and nondiscrimination acts
9. Taft-Hartley and Wagner Acts
10. Walsh-Healy Act
11. The G.I. Bill of Rights

On his own level, the foreman must plan, organize, direct, coordinate and control, just as the upper layers of management must. In this connection, his chief job is to see that production goes on without interruption. But the details for his guidance are handed to him by the production-control department.

In dealing with his workers he is often managing those who have divided loyalties. The share of loyalty they give their company and their union depends to a large extent on the personality of their foreman and the activity of their union local. Top and middle management escape most of this direct contact with worker resistance by leaving the matter in the foreman's hands.

Carrying out company policies is another problem of the foreman. Without the privilege, in most cases, of participating in the drawing up of these policies he must take them as they are handed to him and try to get his men to accept them as fair. Besides all these things, the foreman may also be requested to contribute to flow-of-work programs, work simplification, morale building, and industrial and public relations.

How to choose foremen

The best foreman is the one who is able to get his men to *want* to do the things he wants them to do. The usual practice in filling foremanship vacancies is to pick the most skilled workman in the department, or the one who has had the longest period of service. The thought behind this method is that the foreman must know the technical phases of his department's operations. But though technical knowledge is certainly a great help, it is clear that the foreman's duties require management ability even more than technical skills. He must be able to lead his men. Leadership demands adaptability and the ability to learn as well as to be a sympathetic teacher. He must be able to evaluate facts for the purposes of settling grievances. He must be dependable, intelligent and fair to both workers and the company if his men are to have confidence in his leadership. And finally, he must be able to proceed on his own initiative within the limits of the authority given to him.

The first general decision in foreman selection is whether to promote from within, or attract someone from another company. Many concerns have a fixed rule that promotions should come from within their own ranks. On the other hand, some production managers feel that a foreman chosen from the outside has the advantage of starting on his new job without prejudices. Neither plan is good under all circumstances. The greatest need in foreman selection is an objective method for determining the intangible qualification known as leadership. Tests are always inadequate in determining personality traits of this sort. References and data on family background are interesting but scarcely informative about the candidate's future managerial ability.

Possibly foremanship could be measured by something like the kind of trade test which asks the candidate for a bricklayer's job to lay a reasonable stand of bricks. During World War II the Assessment Staff of the Office of Strategic Services devised some ingenious methods of evaluating, among other characteristics, a man's leadership ability. For example, in the "Brook Test" a group of men, with no designated leader, would be taken to a stream, where scattered around the bank were a number of boards, none long enough to span the stream, three lengths of rope, a pulley and a barrel with both ends knocked out, and a log. The group was told to imagine that the log was a delicate range-finder which had to be transported safely to the other side. To solve the problem, both planning and cooperative action were essential. Trained observers were on hand to evaluate the emerging ability of the group members. "The good leader was the one who commanded the respect and following of others, who had the ability to organize their ideas into a plan, and who was forceful enough to guide his colleagues to the completion of their task with a minimum of friction and a maximum of cooperation." [4]

How to improve foremen

Top management is responsible for taking the initiative in improving company foremen. Although comprehensive training is an important requisite, the program should not spend too much time on the psychology of getting workers to do what they are told to do. Many companies overemphasize this phase of foreman training. Foremen, being a part of management, should be made acquainted with the principles of management. Knowledge of these principles can lead to the other desired objectives.

Knowing how to give orders is an important aid to the good foreman. Broadly speaking, orders should be phrased as invitations to participate rather than as blunt commands. The way an order is given is just as important as what is said.

Keeping informed about company operations is a tool which a foreman can use to great advantage. However, he cannot use it unless he is kept informed by upper management, a procedure which is unfortunately lacking in many companies. Foremen often learn about company matters from their men, who received their information from the union stewards. This inexcusable form of communication leaves the foreman chagrined in his dealing with his subordinates.

Foremen should also be taught the fundamental economics of business. Instructions in methods improvement will enable them to cut costs. As an important part of their training, they should be supplied with manuals that answer the questions of daily routines and guide their planning.

If upper management wants foremen to feel that they are a part of the management team, they must be treated as such. They should be given authority commensurate with their responsibilities. Their pay should provide a differential large enough to demonstrate clearly that their contribution is greater than that of the ordinary worker. A necessary adjunct of reasonable earnings is assurance of job security. Foremen should also be encouraged to come forward with suggestions and be rewarded for acceptable ideas. Upper management should so act in their relations with foremen as to gain and keep the foremen's real confidence. Only then will foremen feel that they are a part of the executive peerage. Finally, custom has established an office as the symbol of management. A place to make and keep records and reports, and to confer in private with workers is not only an outward sign of the foreman's place in management; it *is* good management.

---

[4] The OSS Assessment Staff, *Assessment of Men* (New York: Rinehart & Company, Inc., 1948), p. 98.

FIGURE 6.1

Essentials of a Program for Improving Foremen

1. Set clearly and honestly the company's policy with regard to foremen; define their relationships with employees; and emphasize that the company will back them within these policies.

2. Admit, with reasons, the tough, in-the-middle position of the foreman under today's labor conditions.

3. Establish in the foreman's mind a feeling of job security at least equal to that which organized labor tries to guarantee its members. Assure him that his job is not subject to the whims of some member of top-management. Urge him to think and plan ahead. Relief from fear-pressures will free his energies for constructive thinking.

4. Set forth clearly his status as a part of management, including his authority and responsibility, and see to it that these two principles of management are reasonably commensurate. Establish the line of authority above him, thus relieving him of the feeling that any one of two or three others have control of his destiny with the organization.

5. Help him learn the art of supervision in handling his subordinates, how to satisfy complaints and grievances, how to improve relations with workers, how to get subordinates to want to cooperate, and how to grade performance and appraise workers. Such training should be made a continuous process, based on conference and problem-solving methods.

6. Assure him that as a member of management, he has management's confidence. With this in mind, he should be told about decisions before they are put into practice, and before the "grapevine" or a union steward tells him about them. Only in this way can he be expected to develop a sense of "belonging". Also, sharing in minor policy determinations is an excellent developer.

7. Not only ask, but urge him to come forward with ideas and suggestions on labor policies, as well as with business and production plans for the future. Let him participate occasionally in the formulation of labor contracts.

8. Help him to advance the technical improvements of production, but always emphasize that it is the human element which dominates the mechanical for continued success.

9. Always keep in mind that to the employees the foreman represents the company. When he realizes this, he will want to play his part, and play it adequately from a sense of pride.

Foremen incentives

Most of the incentive-pay plans that have been applied to foremen have been found wanting, and as a consequence most of them have been discontinued.[5] Many failures have been caused by unsatisfactory selection of incentive criteria or standards. Some plans have not only been confusing, but they have retarded the progress toward finding workable incentive-pay arrangements applicable to foremen. A workable plan must obviously be based on factors over which he has control. One group of favored criteria includes volume of production, unit labor costs, total unit costs and savings in scrap and supplies. These standards for measuring foreman effectiveness frequently give cause for varying degrees of dissatisfaction.

In the first place, volume of production may be vitally affected by breakdown of machines or the failure of raw materials or supplies in either kind or quantity. Machine breakdown may be the fault of maintenance, while the failure of raw materials or supplies may rest with the purchasing department, or possibly with that section of engineering which made up the specifications. These and similar faults are attributable to management leaders above the foreman level.

Unit labor costs are often at least half the total unit costs, which also include materials, supplies and production overhead. If production volume falls because of factors suggested in the preceding paragraph, labor and total unit costs invariably rise, a situation which the foreman cannot control.

Likewise, amount of useless scrap made and the excessive volume of supplies used in processing depend on the quality of materials, supplies and tools furnished to each production department. There is a "one best quality" for all three. If the quality of materials and supplies is too high, total unit costs may price the finished product out of the market; if the quality is too low, the volume of scrap is bound to rise, again increasing total unit costs. To be held responsible for scrap losses it seems reasonable that the foreman should be allowed to participate in the selection of materials, supplies and tools used in the processes concerned.

Ability to meet his department's budget is another basis for establishing foreman-incentive plans. But budgetary items are often subject to price fluctuations in materials, supplies or labor, over which foreman control is far from direct, if indeed it exists at all.

Departmental "efficiency" as an incentive index is relatively unsatisfactory because it may require definitions, explanations and even a formula before it can be reduced to a usable standard of measurement. The efficiency index is frequently too complicated for the average foreman. He is not sure that he knows how to influence the formula for his personal benefit, and is correspondingly dubious of what he does not fully understand.

When it is used, worker attendance is one of the incidentals comprising a group of incentive factors. The only apparent influence which the foreman may have over good attendance by his workers is his ability to secure their cooperation. But because there are so many excusable causes for absence, the foreman's ability to decrease absences can have only a slight effect on the over-all attendance record.

---

[5] Information for this section has been taken in part from J. A. Lowden, "Keyman–Supervisory Incentives," *Advanced Management,* Vol. 12 (March 1947), pp. 7–13.

Foreman-incentive plans have been based on all of these factors individually at different times, or on combinations of two or more of them. For the most part, such plans are only partially, if at all, under control of the foreman. Also, as Lowden points out, faulty standards are used to measure most of the factors. He also feels that we are making the same mistakes in developing foreman pay incentives that we made with wage incentives, where we were compelled to revise the piece-work plan because factors beyond control of the employees sometimes reacted to their financial disadvantage. In that plan, management was partially interested in relief from some of the task of managing, which was largely shifted to the worker. The same approach appears in large measure in the foreman-incentive plans which have been discussed. As was the case with piece work, many of the foreman-incentive plans must be corrected to allow for lapses in management's planning for such items as machine breakdowns, shortages of usable materials and supplies, and poor tools.

In general, we are still groping about to find the correct basis for foreman pay incentives. It seems rational to conclude that the reduction of those wastes which the foreman can control to a reasonable extent is the best basis for establishing foreman bonuses. Four types of waste can be singled out:

1. Waste of worker time, due to his own fault
2. Waste of worker time, due to halting production
3. Waste of direct materials in making scrap
4. Waste of supplies

The following discussion of these four types of waste as factors for determining foremen incentives emphasizes two advantages that make them preferable to those already discussed. In the first place, they represent factors over which the foremen can exercise reasonable control. In addition, they offer a common method for measuring incentive bonuses based on ratios of actual performance for the various types of wastes to scientifically determined standards or targets.

To what extent can the foreman control and minimize these four forms of waste? With respect to the first, we have already made some progress by establishing standard production times. When standards are available, to what extent can the foreman induce the workers to meet or exceed them? It is a well-established fact that supervision has substantial influence in this field. Leadership, encouragement, capable training and instructions, and methods improvement, all applied constantly by the foreman and his assistants, are necessary to the attainment of worker production goals as set by time standards. "Until the average actual performance of all qualified operators in a department equals or exceeds that target level, we are wasting production capacity. In the relationship between average actual performance and the target level we have a direct measure of supervisory accomplishment in the control of this waste."[6]

If the target level is reached, we may assume that the foreman has done a satisfactory job, and some bonus payment is in order. The degree to which the target level is above past performance should be the basis for the bonus. This measure is represented by the ratio between past average performance and the target level rather than by absolute quantities. Delay allowances which are beyond supervision's control must be taken into account in the final determination of the bonus. A large number of learners or significant changes in materials or processes are examples of those things which call for delay allowance.

The second waste, that of worker time due to halting production, can be under the foreman's control to a large extent if he is permitted to participate in plans for avoiding it. Halts in production may be caused by lack of balance in machines, materials or supplies. Machine breakdowns, defective tools and materials are other causes. In some instances these delays are beyond the foreman's control, but in most cases proper planning will eliminate them. In any event, it is apparent that pay incentives will encourage the supervisory group to adopt preventive measures. "In the ratio of the total time wasted by delays to the net volume of work produced as measured by time standards we have an index that can be used to measure control of this waste in a consistent manner through periods of fluctuating output."[7] Here too, we must measure the waste against scientifically established standards rather than against mere records of past performance under unspecified conditions.

The third and fourth items of waste, making scrap and wasting supplies, can be considered together. In some departments these factors may be relatively insignificant, but where the opposite is true, experience proves that great savings can be made by adequate foreman supervision. Savings in these categories directly reflect the quality of foremanship, and should be rewarded accordingly. Selection of tools, and instruction in their proper use, are waste-savers under the foreman's control. Machine maintenance is another controllable factor that yields results in reduced scrap. The cost of supplies can be kept to a minimum by good housekeeping and careful supervision.

With these two types of wastes, as with the others, rewards should be based on the ratio of accomplishment to adequately determined standards of performance. To a large extent, the waste from scrap and the misuse of supplies varies directly with the volume of production. Bonuses based on the production of one item will be easy to determine because the standards are simple. When a variety of items is being produced, some common measure other than production is required. Possibly the ratio of the cost of scrap and supplies to the hours of measured work will give a satisfactory index for determining incentive bonuses under such circumstances. Experience shows that savings as high as 25 per cent can be accomplished by proper supervisory attention to the cost of scrap and supplies.

---

[6] *Ibid.*, p. 9.

[7] *Ibid.*, p. 10.

Foreman unions

The place of foremen in the management team must be considered in the light of its recent history. At the present time, relations between foremen and the rest of management are fair to good. But during and immediately after World War II, the relationship was strained almost to the breaking point. It is important to understand the reasons for this strain in order to prevent its recurrence at some time in the future.

Foreman relations to management have gone through three well-recognized stages since the turn of the century. Prior to management's installation of staff services to relieve some of his supervisory burden, the foreman was definitely a part of the management team, with authority to hire, fire, promote and transfer.

The second period ran roughly from the Wagner Act of 1935 to the Taft-Hartley Act of 1947. The Wagner Act, in its definitions of "employer" and "employee," left the foreman's status ambiguous. Sometimes the courts and the official labor agencies would classify him as an "employer," sometimes as an "employee." Furthermore, the gains achieved by the workers through the passage of the Wagner Act made for less and less differential between the foreman and his subordinates. The foreman could not count on top management for a clarification of his status and rights, because top management was always afraid of being cited for "unfair labor practices."

The long period of strain was brought into focus in the summer of 1941, when four of Ford's foremen organized the Foreman's Association of America. In 1938 the CIO had made a strenuous effort to organize about nine hundred foremen in the automobile industry, only to abandon its effort a year later. However, the separate unionization of foremen caught hold like wild fire in the latter part of 1941. The FAA had almost 40,000 members by 1945, without paid organizers. Here was an organization to command respect, especially when it was realized that there were approximately a million foremen in industry.

The general feeling among foremen that they were actually not a part of management was a grievance of long standing. That feeling was fanned into action by conditions which increased the hours and rates of many war workers until their take-home pay exceeded that of their foremen's salaries. Management believed that the chief promoters of the foreman's union were the large number of new foremen who had lately risen from the ranks, a contention which the FAA denied. There is no doubt that the younger foremen were afraid they would lose their jobs when the war was over

On the other hand, many of the older foremen were afraid that the young men would take their jobs when production demands returned to normal. All foremen felt that the pay differential between themselves and their workers was too small. Some felt that their authority was not in line with their increasing responsibilities, that the number of workers they supervised was excessive, and that since they had no grievance procedure they could be fired without cause and without redress. In reply to this last objection, upper management assured foremen that its "doors were always open." But one cynic replied that the door was left open so that the foremen would not break the glass on their way out, a jest which really expressed the intensity of foreman feeling.

The new foremen's union was destined to a short and turbulent existence as a bargaining force. Prior to the National Labor Relations Act (Wagner Act) of July 1935, it was generally understood that foremen had a right to organize to protect their common interests. However, between 1943 and 1946 there were three important and conflicting decisions affecting foremen unionization.

The *Maryland Drydock Case* (May 11, 1943) was the first decision regarding the foreman's status under the Wagner Act. In this case the National Labor Relations Board reversed its former stand, and decided that supervisory groups were not entitled to collective-bargaining rights under the Wagner Act.

In the *Packard Case* (March 26, 1945) the NLRB reversed its decision in the Maryland Drydock Case, holding that employers were bound to bargain with supervisory unions if they were not affiliated with rank-and-file unions of production workers. This decision left open the right of affiliated foremen unions to demand bargaining rights with their employers.

Later the same year, the NLRB decided, in the *Jones and Laughlin Steel Company Case* that the privileges and protection of the Wagner Act should be extended to foremen affiliated with a union of production workers. *Business Week* made the editorial comment that the decision came close to "creating a perfect or revolving mess, i.e., a mess when viewed from any angle."[8] Since the union in question was affiliated with the United Mine Workers, the decision was hailed as a John L. Lewis victory. The way was now open for the organization of foremen's unions on both exclusive and affiliated bases.

The cause of the conflicting decisions came from two definitions in the Wagner Act. It defines an *employer* as "any person acting in the interest of an employer," which certainly includes the foreman. At the same time, it states that "*employees* shall have the right . . . to bargain through representatives of their own choosing," and foremen are certainly employees. So the foremen were both employers and employees!

Industry was up in arms over the Jones and Laughlin case. General Motors made a public statement which was carried in newspapers and issued as a flyer. The question was: "Should management be unionized?" After explaining why the decision was bad for foremen, for industry, for labor, and for America, General Motors stated its position as follows:

---

[8] No. 864 (March 23, 1946), p. 120.

> In General Motors, foremen are the MANAGERS of their departments. They participate in establishing management policies in both production and personnel matters. They have full authority to approve or disapprove the hiring, to supervise the work, and to make work assignments of the employees under their supervision. They initiate wage increases, transfers and promotions. They are directly responsible for the efficiency and safety of their group. They have full authority when necessary to take immediate, appropriate disciplinary action for violation of shop rules, and other improper conduct of their employees. They are the first point of management contact and make the first management decision on all matters relating to the employees under their direction.

The tide turned when the Taft-Hartley Act (1947) made foremen a legal part of the management team, and barred them from production unions. After a forty-seven-day strike against the Ford Motor Company, the FAA called off its pickets in July 1947. That event practically marked the end of the FAA as a bargaining force. Finally, the passage of the Taft-Hartley Act marked the beginning of a sustained and earnest effort on the part of upper management to make it more clear by act and deed that the foremen were really members of the management team.

What foremen want

At least a month before the FAA called off its pickets and gave up the strike, the Ford Motor Company launched a new program to make foremen a more effective part of management. It set up a new "Management Relations Department" with jurisdiction extending through the entire range of management, including foremen. The department took on new energy after the strike ended. Like most progressive managements, the Ford Company learned a good deal from the foremen's revolt. The strains in the foreman's ambiguous status had been present all along, demanding radical corrective action from top management. The strike served to bring matters to a head and to stir management into taking the prompt remedial action which it had long been clear would have to be taken sooner or later. Many companies started plans to give a new status to their foremen, and the situation has been continually improving. The Ford plan, like many others, provides more authority, more pay, more contacts with upper management and greater job security for the entire supervisory group.

The Crosley Division of Avco Manufacturing Corporation has been able to measure the success of a new training plan for foremen. Its program resulted from an obviously realistic approach — a survey of foremen to find out what they wanted to learn. The training sessions are now conducted by department heads on a discussion basis. The old method of lecturing to foremen was seen to be a bad psychological tactic in convincing supervisors that they were a part of management. The company believes that the new training approach is responsible for a 10-per-cent increase in plant-wide efficiency, reduction of the ratio between indirect and direct labor costs, and the development of team spirit among the foremen.

What foremen needed most of all after 1948 was to find a new and safe landing place after the turmoil of war production expansion, rapid unionization and the confusion of the NLRB decisions, all of which left them in an industrial no man's land. Management is now attempting a new setup based on the lessons learned during that period of confusion. Top management cannot accomplish its over-all purposes unless it is aided by a healthy relationship with its supervisory force. Only under such conditions can it re-establish the foreman as an effective means of two-way communication up and down the management ladder.

The foreman is not only a representative of management to the workers, but also a representative of the workers to management. He is the direct contact with the company's employees. To his men, the foreman *is* management. On that basis the workers expect that their only representative of management should have the authority to redress their grievances and stand up for their rights in dealing with upper management, who to them are a relatively nebulous group of men in an ivory tower.

The reasons why foremen join unions express in part the things they want from management. In joining unions they feel that their organization can accomplish more of the things they want than they are able to accomplish when acting as individuals. The Foreman's League for Education and Association reports fifteen reasons why foremen join unions.[9] Chief of these are lack of understanding by foremen of top-management problems, disparities between the foreman's responsibility and authority, and desire for security. These are the long-range complaints, the ones which will take time and thought to correct. Most of the other reasons for joining unions are short-range, and can be overcome by top management with reasonable expedition.

The foreman wants:

1. Job security
2. Closer contact with upper management
3. More authority in hiring, firing and promotions
4. Salary commensurate with his responsibilities
5. Pay adjustment for prolonged overtime
6. Authority to carry out assigned responsibilities
7. An open path for the redress of grievances
8. An office of his own, with clerical help as required
9. Fringe benefits that are accorded management
10. Training geared to his job responsibilities
11. Necessary aid in training new workers
12. Recognition for usable suggestions

---

[9] "Are Foremen Really Management?" *Factory Management and Maintenance,* Vol. 105 (May 1947), p. 72.

13. Management privileges based on foreman status
14. Participation in policies affecting foremen duties

Conclusions

Functionalized staff organizations, such as personnel, maintenance, production planning and purchasing have sapped the foreman's authority, while government regulations and increased activity of union locals representing production workers have increased his workload and his responsibilities. Periodic pay increases of his production subordinates have often decreased his pay differential, and in some cases where the worker receives premium pay for overtime, holidays worked, and shifts other than the regular daytime period, workers' wages have actually exceeded the foreman's take-home pay.

Professional staff offices tend to come between the foreman and the upper layers of management, as well as between him and his men. They also decrease the foreman's opportunities to make decisions directly affecting his work, decisions which he has been long accustomed to make without such assistance. Because these new departments have had the effect of lengthening the chain of command between foremen and top management, they have often turned out to be obstacles in the foreman's upward channel of communication.

Some way must be worked out to control the kind of bureaucratic management which has tended to clutter the foreman's job with unnecessary and impractical duties. The bureaucracy of overspecialization in some management organizations is characterized by the same sort of vested interest delays, confusion, red tape, and lack of understanding which business so justly condemns in its relations with governmental agencies.

The foreman is really in the middle as far as the management team is concerned. His situation is made more difficult because middle management often appoints him to his position on the basis of technical skills or seniority rather than for his supervisory ability, and then does not train him properly after he is on the job. In addition, on-the-job training of workers is frequently unsatisfactory because the foreman has neither the teaching ability nor the time to do it properly. The production-planning department instructs him about what to do, when to do it, and how to do it, thus curbing his initiative and increasing his frustration. His responsibilities are not matched by his authority, and his rewards are meager in comparison with his responsibilities. Unionization and scarcity of labor often stymie his best efforts. Top management usually overestimates his abilities and underestimates his real worth. For the most part, the foreman has plenty of grief without commensurate satisfaction.

With these factors in mind, it is understandable why the bench worker often turns down an opportunity to advance to a foremanship, while others ask to be put back at the bench after a short service as foremen. In either case, their explanation is that the pay differential is not worth the headaches involved.

The blow-up in the foreman's job between 1941 and 1947 has served to attract the attention of top management to the point where many complaints have been given serious attention. From management's threats in 1945 to eliminate the title of foreman and substitute some other managerial arrangement, we have swung around to the decision that the foreman's place in the management hierarchy is here to stay, but must be made more important than it was for a decade prior to 1947. This is the situation at the present time. The foreman is just beginning to feel the improvement and react favorably to it.

QUESTIONS

1. When, and by what circumstance, was the foreman legally placed in the management group?
2. Enumerate some of the foreman's outstanding responsibilities to management and to the workers.
3. What change was brought about in the foreman's status by the establishment of such staff and service functions as personnel, maintenance, purchasing and engineering?
4. Mention three legal regulations which added materially to the foreman's duties.
5. What divided loyalties of the worker increase pressure on the foreman?
6. What plan did the OSS use for selecting natural leaders for small work groups?
7. What are the relative advantages and disadvantages of selecting foremen from the work force?
8. To what extent should technical skill and leadership ability be given weight in determining foreman selection?
9. Outline a plan for developing foremen on the job.
10. Enumerate the factors which should be included and excluded from a foreman incentive-pay plan, and explain your reasons.
11. How can foremen be geared to control of waste?
12. Explain the rise and fall of the foreman unions.
13. What does the foreman expect from management?
14. Why do workers frequently refuse promotion to foreman status?
15. What contributions to foreman confusion were made by government agencies and the courts?

CASE PROBLEM

The Roberts Equipment Company

The Roberts Equipment Company has been manufacturing pistons for automobile engines for over forty years. There were four foremen in the original firm, and these men exercised considerable power and authority over their departments. They hired and discharged their own workers. There was no plan for appealing their decisions if the employee felt that he had received unfair treatment.

Because of the autocratic rule of the supervisors, the workers formed a union in 1938, which was duly recognized by the National Labor Relations Board. The company found itself in difficulty with the Board almost immediately because of some of the practices of its foremen. The employees were threatened by the foremen with discharge if they joined the union. Consequently, the company was found guilty of an unfair labor practice by the Board. Several other unfair practices were cited by the union because of actions of the foremen. In each case the company was found guilty. To avoid further difficulty, the concern hired a personnel manager, giving him authority to hire and discharge employees.

During World War II, the firm expanded, adding ten more foremen and six assistant foremen to the supervisory rolls, making a total of twenty. The rank-and-file employees began to earn higher pay because of overtime. When the supervisors realized that their subordinates were receiving more pay than they were, they formed their own union. This organization was not too successful. With the passage of the Taft-Hartley Act in 1947, the company refused to bargain with its foreman union. Three of the foremen were retired, and their positions were not filled.

By 1948, the foremen had very little authority but considerably more responsibility. Among other things, they and the assistant foremen were expected to train all of the employees hired by the personnel manager. In addition, the foremen were instructed to establish the production standards for the purpose of computing wage incentives. They were also called on to perform the maintenance and inspection functions in their departments. Grievances were handled by the union stewards through the personnel manager. Wage rates were set by the personnel department for all employees. Sometimes the foremen were consulted about individual wage rates, but usually they were not. Frequently, the union stewards knew more about what was going on about the plant than the supervisors did.

One foreman supervises 100 men on an assembly line, whereas the foreman of the foundry has 15 subordinates. All foremen are paid the same amount—$5200 a year. One old foreman who is due to retire next year has been paid an additional bonus of $800 a year.

PROBLEM. Outline the steps you would take to make the foreman a definite part of management.

CHAPTER 7

Principles of Organization

Organization is implicit in all forms of successful social endeavor.[1] Whenever two or more people *have* to work together for the achievement of a common purpose — that is, whenever the desired goal cannot be attained through the efforts of one man alone — then the effort must in some way be organized. There must be some agreement on how the labor is to be divided. If two men are trying to push a car out of a snow bank, they must first agree on the direction in which to push and, for best results, they must time their action so that they are both pushing together. Without such elementary organization, they may find themselves working at cross-purposes. This is perhaps the simplest form of division of labor, where the participants are all performing the same action at the same time to attain a goal that no one of them could reach alone.

An equally common and more important form of division of labor is the situation in which two or more persons must perform different operations — and often at different times and in different places — to accomplish a common purpose. This way of organizing human effort is universal. For example, anthropologists have found that in all nonliterate societies, the division of labor between men and women is always clearly defined. The particular tasks that each is expected to do differ from one tribe to another, but there is always a general agreement that, if a sufficient food supply and adequate protection against the elements are to be maintained, the work must be subdivided in some way so that different people can be performing different and necessary tasks at the same time.

In one respect, the primitive communities enjoy an advantage over modern industrial societies, because in the former the assignment of tasks is largely a matter of tradition. Primitive economic organization, when it remains uninfluenced by industrial civilization, is conservative. The same processes repeat themselves year in and year out and the division of labor changes very little. A child will grow up with a fairly clear idea of just what operations he is going to be performing throughout his adult life.

---

[1] Three excellent sources for detailed study of the philosophy of organization and its principles are: Alvin Brown, *Organization of Industry* (New York: Prentice-Hall, Inc., 1947); James D. Mooney, *The Principles of Organization* (Rev. ed.; New York: Harper & Brothers, 1947); and L. Urwick, *The Elements of Administration* (New York: Harper & Brothers, 1944).

The modern business or industrial entrepreneur can count on no such culturally preordained arrangements of activities and no such fixed expectations on the part of the workers. He must organize his enterprise from the ground up. But the modern manager — or at least the scientific manager — does not have to start his job of organizing completely "from scratch." For he has at his disposal a growing body of organizational principles to serve as fundamental guides to action. By applying these principles through established methods, procedures and systems, modern management has raised organization to a science, and banished the untrustworthiness of knowledge gained from tradition and experience alone, knowledge which may, but just as often does not, apply in the rapidly developing and ever changing economic world of today.

So far we have been speaking of organization in the broadest sense of an agreement between two or more persons to divide their efforts to attain a common goal. For the purposes of this chapter, we can return to the more specific definition set forth in Chapter 2, where organization was defined as *the process of building, for any enterprise, a structure that will provide for the separation of activities to be performed and for the arrangement of these activities in a framework which indicates their hierarchical importance and functional association.*[2]

Like the broader definition, this more specific statement views organization as an association of persons for accomplishing a common purpose. In addition, it introduces the notions of hierarchy and functional association among the activities to be performed. It should be emphasized, further, that organization has for its object not only persons but things and ideas as well. As Henri Fayol expressed it: "To organize a business is to provide it with everything useful to its functioning: raw materials, tools, capital, personnel." [3]

It is obvious that without organization, formal or informal, management would be a composite of floundering and confusion. Nevertheless, there are some executives who feel that to look with suspicion on organization as a tool of management is to be "practical." This feeling is based on the false premise that organizational techniques, principles and charts are "theoretical." Such executives either forget or do not know that principles, by definition, are theories that have demonstrated their success in practice and have thus become guides for future action. Nothing could be more practical than principles. Lyndall Urwick, an English authority on organization, comments as follows on this unfortunate executive opinion:

---

[2] This has much in common with Oliver Sheldon's definition: "Organization is the process of so combining the work which individuals or groups have to perform with the faculties necessary for its execution that the duties, so formed, provide the best channels for the efficient, systematic, positive, and co-ordinated application of the available effort." *The Philosophy of Management* (New York: Prentice-Hall, Inc., 1923), p. 32.

[3] *General and Industrial Management,* trans. Constance Storrs (London: Sir Isaac Pitman & Sons, Ltd., 1949), p. 53.

> For this attitude there are a number of reasons.
>
> In the first place successful administrators, whose example and teaching must necessarily carry great influence, have usually been brought up in the empirical school. And by the time they are successful they are very apt to attribute their achievement to unique personal qualities rather than to adherence to principles. Their performance as organisers seems to them part of the "mystery" of their art, something which can only be conveyed by "experience," not something which can be reduced to writing and discussed by comparative apprentices.[4]

Experience may be unrepresentative. The fact that a practice worked once in the past is no guarantee that it will ever work again. A given practice or procedure is always an action taken within the larger framework of organization. For a past practice to serve as a model for future action, its relation to the total organization must be understood, and an understanding of such a part–whole relationship naturally requires a thorough knowledge of the whole — in this case, a knowledge of organization and its principles.

The Structural Elements of Organization

There are five fundamental elements which must be considered in building the organizational framework of a business.[5] Attention must be paid to all five of these elements, irrespective of whether the enterprise has a line, staff, functional or committee type of organization.[6]

1. *Determination of the scope and purpose of the enterprise.* Before an organization structure can be built, the nature of the enterprise must be clearly specified, as well as the extent of the territory in which it proposes to produce and sell and the channels through which it will distribute its products.

2. *Demarcation of distinct and dissimilar functions and activities.* The significance of this element is contained in the dictum: form follows function. Closely related activities should be grouped and, conversely, dissimilar activities should be kept apart from one another in drawing up the organizational structure. In this way, similar activities can be subjected to one and the same control, whereas the same controlling agency will not have to be responsible for quite different activities. When organizational structure does not follow function, there arises a further disruptive tendency for the jurisdictions of many executives and supervisors to overlap with one another.

3. *Definition of levels of authority and responsibility.* Authority and

---

[4] *Op. cit.,* p. 40.

[5] Much of this discussion is based on the suggestions of Dr. H. A. Hopf, in an address entitled "Organization, Executive Capacity and Progress," delivered at the annual conference of the Life Office Management Association in Boston in September 1944, and published in *Advanced Management,* Vol. 11 (June 1946), pp. 34–47.

[6] This organizational typology will be discussed in Chapter 8, pp. 141–149.

responsibility should be clearly defined for each of the various executive levels. The degree of authority and responsibility should be commensurate with the importance of the activities assigned at any given level. This fundamental will be discussed in more detail later under Principle 13.

4. *Establishment of means of communication and interaction.* Having broken down the enterprise into distinct and dissimilar activities and defined the several levels of authority, it becomes essential to build into the structure means of communication and interaction that will pervade the organization and bind together what has had to be broken down. This necessary interaction of the separate parts will not be spontaneously generated, but must be deliberately established by techniques of communication, coordination and control. The organization structure is only a static design for action. To be given a life of its own, it must be energized by some intangible force, which is capable leadership, based on authority and operating through organizational channels.

5. *Provision for adaptation and growth.* Any structure must be flexible enough to allow for adaptation to change and growth. Once the organizational design has been transformed from a lifeless structure into a living and growing organism, then like all living things, it is in a state of perpetual movement and change. It must respond as a whole to changes in the external environment and it must undergo internal transformations to facilitate the interaction of its component parts. If the structural design is not constantly re-examined and adjusted to fit the needs of the organization in action, then structure may become an instrument of constraint, eventually choking the life out of the living organism. Evidence of the neglect of this fifth fundamental is seen in the numerous business reorganizations through which the unfortunate concerns have to be relieved of this hulk of dead structure before they can begin to grow and prosper once again.

Executive capacity

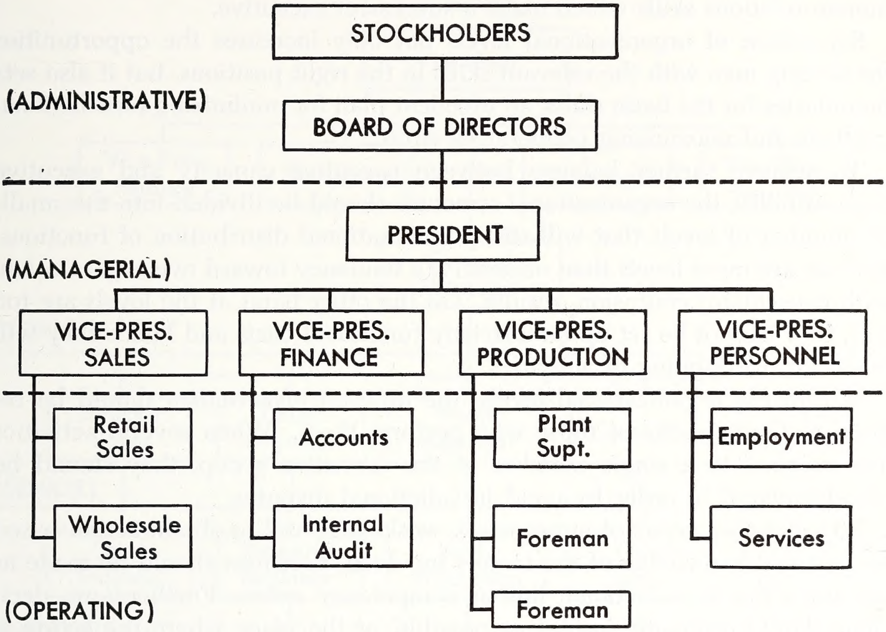
Executive capacity is a prime consideration in applying the fundamentals of organization. The impact of structural design on executive performance, and the limiting factor of executive capacity, require balancing in a design that will accommodate differences between the magnitude of functional responsibility and the capacity of the executive to meet its challenge.

Another factor in the translation of executive skill to organizational design has to do with the difference in the *nature of the skills.* These differences may be accentuated to advantage by dividing the structure into major administrative, managerial and operating divisions or levels. This breakdown is illustrated in Figure 7.1. Different kinds of skill are required at each of these three levels.

The *administrative* level requires conceptual skills. One authority in the field of administration defines conceptual skill as "the ability to see the enterprise as a whole; it includes recognizing how the various functions of the organization depend on one another, and how changes in one part

FIGURE 7.1

Primary Organization Levels


STOCKHOLDERS
(ADMINISTRATIVE)
BOARD OF DIRECTORS
PRESIDENT
(MANAGERIAL)
VICE-PRES. SALES
VICE-PRES. FINANCE
VICE-PRES. PRODUCTION
VICE-PRES. PERSONNEL
Retail Sales
Accounts
Plant Supt.
Employment
Wholesale Sales
Internal Audit
Foreman
Services
(OPERATING)
Foreman

affect all others; and it extends to vitalizing the relationship of the individual business to the industry, the community, and the political, social and economic forces of the nation as a whole."[7] It is on the basis of this conceptual skill that the administrator is in a position to establish basic company policies.

The *managerial* level gives effect to the basic policies developed by the administration. Essential to this level is the ability to coordinate the activities of the various departments. Like the administrator, the manager must see the enterprise as a whole. He must be able to see the significant details, the signals that something is getting out of control, without allowing himself to be bogged down by matters that can be handled by others. Unlike the administrator, the manager is continually called upon to make decisions quickly. This requires a stable and resolute personality and makes human-relations skills particularly important at this level. For the manager must know how to work effectively with his subordinates and he must know his men well enough to be able to delegate responsibility with the assurance that his assignments will be carried out.

It is technical skills, above all, that are required at the *operating* level. This is so in any line of business, but especially in industrial concerns. It should be stressed that a man with the education and intellectual ability to be a brilliant engineer may often lack the combination of conceptual and human-relations skills which make a successful executive.

---

[7] R. L. Katz, "Skills of an Effective Administrator," *Harvard Business Review*, Volume 33 (January-February, 1955), pp. 35–36.

Separation of organizational levels not only increases the opportunities for putting men with the relevant skills in the right positions, but it also sets boundaries for the basic skills, an excellent plan for minimizing jurisdictional conflicts and maximizing cooperative effort.

To achieve further balance between executive capacity and executive responsibility, the organizational structure should be divided into the smallest number of levels that will still permit rational distribution of functions. If there are more levels than necessary, a tendency toward overorganization, with consequent confusion, results. On the other hand, if the levels are too few, they cannot be set up on a strictly functional basis and hence they will make for overlapping of activities.

Within the organizational levels, the *division of activities* should be related to the capacity of those who perform them. When several activities are assigned to a single member of the executive group, they should be closely related in order to avoid jurisdictional disputes.

To relieve superiors of unnecessary workloads, and to obtain action based on personal knowledge of the factors involved, *decisions* should be made as far down the organizational line as competency exists. Furthermore, decisions should originate, insofar as possible, at the place where the action is going on. This rule is based on the valid assumption that, admitting competency, those responsible for taking the action will have the best information on which to base a decision.

To assist in speedy executive decision, *information* coming up through the organization should move as fast as possible, and be converted into a form in which it can be used for control purposes by the executive whose responsibility is involved. Such conversion of information by analysis into recommendations for the attention of superiors, represents completed staff work.

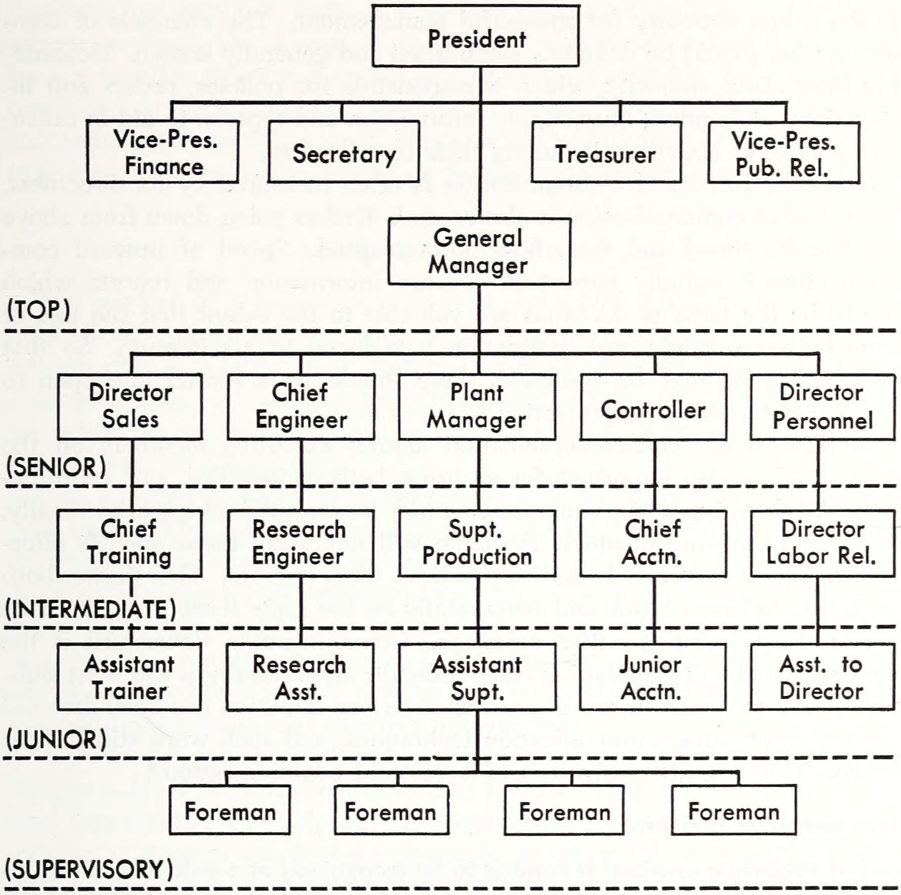
Finally, executive action should be based primarily on individual authority. Group counsel and advice is always in order, but group authority and action should be limited to those cases where such procedure is demanded for purposes of coordination.

Executive levels

To prevent overorganization or overwork of executives, it is important that attention be given to the number of executive levels in any organization. The maximum number has been generally agreed on as six, with recommendation for five. In a five-step executive organization, the levels are usually known as top, senior, intermediate and junior executives, and the supervisory or foreman group. On the top level would be the president, vice-presidents, secretary, treasurer and general manager. The second level would include such officers as the chief engineer, sales manager, plant

FIGURE 7.2

Management Levels


President
Vice-Pres. Finance
Secretary
Treasurer
Vice-Pres. Pub. Rel.
General Manager
(TOP)
Director Sales
Chief Engineer
Plant Manager
Controller
Director Personnel
(SENIOR)
Chief Training
Research Engineer
Supt. Production
Chief Acctn.
Director Labor Rel.
(INTERMEDIATE)
Assistant Trainer
Research Asst.
Assistant Supt.
Junior Acctn.
Asst. to Director
(JUNIOR)
Foreman
Foreman
Foreman
Foreman
(SUPERVISORY)

managers, controller and director of personnel. On the third level would be found top assistants to senior executives, and important subexecutives. Junior executives and assistants to superintendents would largely comprise the fourth or junior executive level, while those who are in direct contact with the workers — the foremen and supervisors — would be on the fifth management level. Figure 7.2 shows the relation of these five management levels.

Management levels are important from several standpoints. They determine to a large extent the range of responsibilities and authority, and the salary scale. It should be recognized, however, that executive salaries are based partly on considerations other than management levels. Training, experience, number of persons supervised and competitive salaries on the outside all play a part.

Communication

Communication is essential for effective coordination, and coordination is the prime necessity for successful management. The channels of communication should be definitely established and generally known. Descending lines show authority, which is responsible for policies, orders and instructions. Ascending lines supply information and reports, to aid in executive control of activities, including their coordination.

The effectiveness of communication is often measured by its directness, but speed of communication is also crucial. Orders going down from above are usually timed and their flow uninterrupted. Speed of upward communication is equally important because information and reports which are to be the basis of decisions are valuable to the extent that the loss of time between source and destination is reduced to a minimum. So that communication may be complete, there should be a formal line open to every member of the organization.

Horizontal or cross-communication among executive members on the same level is also important for securing both cooperation and coordination. All three types of communication may be represented organizationally, but merely making channels available will not make them operate effectively. There must also be a desire to have them operate. That desire, both vertically between levels and horizontally on the same level, must often be prodded by senior-executive attention. Communication downward is the easiest to maintain; upward is more difficult; and laterally is the most difficult of all. It is only in recent years that serious attention has been directed toward stimulating communication techniques, and such work still has far to go. This is particularly true of horizontal communication.[8]

The executive assistant

The executive assistant is coming to be recognized as a valuable aid to his chief in exercising the exception principle of management, and in improving communication and coordination both in his own bailiwick and among other activities of the organization. He makes departmental and other contacts and prepares information in condensed form to conserve his chief's time. In the more advanced stages, he may also make recommendations. He issues orders and instructions in his chief's name, and in minor matters where policies and procedures have been established he may make decisions on his own initiative.

It is easy to understand how a capable executive assistant can make a valuable contribution to speedy and smooth operation of an organization. However, difficulties may easily arise in such a relationship. It has been observed that "the greatest practical difficulty in introducing the concept into business life will be found to center around the custom of assuming that function determines status." In other words, since the assistant is handling top activities, there is a tendency for intermediate or junior line officers to resent his "display of authority." This factor makes it important for the assistant to assume an attitude in keeping with his rank rather than one based on the nature of his work and contacts. If he is able to do his job successfully and maintain good relations with his junior line superiors, he is in a position leading to executive management on his own responsibility.

---

[8] Horizontal communication has been given scientific attention by Henri Fayol, who illustrates the situation with his "bridge" or "ladder." See Fayol, *op. cit.*, pp. 34–36, and L. P. Alford and J. R. Bangs, *Production Handbook* (New York: The Ronald Press Company, 1948), pp. 28–29.

Principles of Organization

The purpose of organization is to work out a plan which will provide the most effective operation of a concern; the purpose of management is to carry out the plan profitably. It is obvious, therefore, that the two purposes are complementary. Because of this dovetailing, certain principles, or guides for action, in the two fields are necessarily similar, as will be observed by turning back to Chapter 4.

The scientific analysis of organization and the formulation of guiding principles in this area are much more recent developments than scientific attention to the principles of management. As a consequence, the principles of organization still lack refinement and recognition. However, the pioneering work in this field during the past two decades has greatly stimulated interest. The future is promising, but much remains to be done. Business has all too often failed to see the practical relationship between scientifically planned organization and effective management.

In presenting the principles of organization, there is no pretense at covering the subject in more than a sketchy fashion. One of the writers in this field lists ninety-six principles.[9] Although there may be some differences of opinion as to what constitutes a principle, or indeed of the validity of some of the principles expounded in this field, the material published since 1940 gives an indication of the growing interest in this vital subject. The following principles are offered as the most important.

1. Objective

A clear and complete statement of the objective is a necessary preliminary to all activity. Statements of policy, the development of plans, and even the approach to the organization structure are dependent on the objective to be attained. Since organization is a means to concerted effort, the objective of the effort must be clearly formulated before the organization begins to operate. An adequate structure requires a clear conception of its purpose. All of its activities must be focused toward the major objective. A change in the organization's over-all objective will require alteration in its structure.

[9] Alvin Brown, *op. cit.*

2. Analysis

For accurate separation of functions and activities, and the assignment to them of their relative degrees of responsibility, the objective must be thoroughly investigated and analyzed. The organization structure cannot be properly built without a complete knowledge of how the objective is to be attained. Since the primary goal of a business concern, for example, is to make a profit while maintaining broad social objectives, it is clear that analysis of the prospective endeavor would first consider the extent and location of the demand for its product or service at a price, based on cost plus a fair profit, which the buying public is able and willing to pay. This is only the first and most fundamental problem to be analyzed; there will be many others.

3. Functionalism

The organization structure must be built around distinct and dissimilar activities, and not around individuals. Functionalism distinguishes between kinds of duties. It is essential that activities be divided according to their nature to obtain the control of related parts by a common source. Line, staff and control activities should be set up in logical subdivisions to avoid overlapping and insure that each individual receives orders from one superior. As has been stated, form follows function; structure is built around needs. Any other basis for structure will lead to organized confusion. It is only by the observance of functionalism that the power of organization as a whole is greater than the sum of the powers of its parts. A necessary corollary of functionalism is that all duties, responsibilities and authority must be defined in writing.

4. Homogeneity

An effective organization must be designed so that only duties and activities of a similar or related nature are assigned to an individual or group for accomplishment. Homogeneity should be understood to include, as far as possible, all related elements in a managerial assignment and to exclude all duties unrelated to the assignment. The reason is simple from a managerial standpoint. The object is to promote the efficiency which results from specialization. It is equally obvious that the farther down the hierarchy, the easier becomes the homogeneity of duty assignments.

The size of the task represented by related duties may create a limiting application of the principle of homogeneity. The task may be too small or too large for assignment to one individual or group. The principle of a proper workload, therefore, may conflict with homogeneity of assignment in occasional instances. Not all assignments are uniform in duties nor equal in volume. This is an example of a situation where planning judgment may modify the application of a perfectly valid principle. In a conflict between the application of a principle and the situation at hand, judgment evolves a compromise plan that best fits the facts.

5. Coordination

The proper arrangement of a group effort is absolutely essential to unity of action in pursuit of a common purpose. Coordination is the fundamental principle of organization. Means of coordination must be built into structure; the spark motivating it is the leadership of authority, which is the exercised right of command. Authority is the supreme coordinating power. The purpose of many of the other principles is to obtain coordination within the structure. Coordination of operations and efforts is the foundation of smooth performance.

6. Communication

Adequate communication is essential to effective coordination. The longer the chain of command, the more essential is the establishment of adequate channels of communication for speeding the flow of policies and orders downward and suggestions and reports upward. "In an exhaustive theory of organization, communication would occupy a central place, because the structure, extensiveness, and scope of organization are almost entirely determined by communication techniques." [10]

Unless the channels of communication are sufficiently short and direct, there is a tendency to "jump" or avoid them by members of the executive groups, particularly by those who want to "get things done." Jumping channels does more harm than good in the long run, but the tendency is always present where the channels are indirect or unnecessarily long.

7. Scalar Process

It is necessary that there be a formal gradation of steps from top to bottom of the organization, through which the coordinating authority can operate. The result of this process of providing graded steps of responsibility and authority within the organization is called the scalar chain or hierarchy. The word "scale" means an ascending or descending series. The scalar process refers to a rank-ordering of duties, as distinct from a functional classification of them. Mooney suggests that the scalar chain is often erroneously thought of as a type of organization — the line type. But he correctly points to the universality of the scalar chain, and this precludes reference to it as a type.[11]

8. Control

Organization should provide for the control of functions, activities, operations and personnel within structurally defined areas of jurisdiction. Control means checking to see that everything is done according to the plans, rules, procedures and orders that have been issued. The plans, rules, procedures and orders must establish standards against which accomplishments can be measured for the purpose of control. It is the "seeing that it is being done according to instructions" principle. Control is the basis of what used to be known as "trouble-shooting." The difference is that controlled trouble-shooting provides the means for reporting results and comparing them with established standards. It enables the person doing the controlling to distinguish between those things which require attention and those which do not.

---

[10] Chester I. Barnard, *The Functions of the Executive* (Cambridge, Mass.: Harvard University Press, 1938), p. 91.

[11] *Op. cit.*, p. 14.

Since control is based on records or reports and the recommendations compiled from them, certain guides (sometimes referred to as principles) have been set up for reporting, so that control can be made as effective as possible. Stated simply, these guides require that control reports should contain only matter useful for the control contemplated (utility), that the data represented should be expressed in uniform terminology or standards (uniformity) and present information comparable with prior reports (comparison).

9. Span of Control

The number of executive or technical subordinates whom a superior can directly supervise and control is definitely limited. Various writers on the span of control suggest definite numbers of subordinates who can be controlled by a single superior. On the executive level the number ranges from three to six or seven. The span depends, of course, on the vigor and intellectual capacity of the superior and the effective capacity of his subordinates. It also depends on the intricacy and differences of the subject matter handled by the subordinates. The physical distance between the supervisor and those he controls is another factor which must be considered.

Irrespective of these variables, it is evident that there is a limitation to the time and capacity of all human beings, including executives. When the capacity limit for controlling subordinates is exceeded, decisions and action are slowed. This means poor coordination for the organization and lack of planning time for the controlling executive.

The fixing of definite numbers of subordinates for control purposes is based on the theory of Graicunas, which has already been explained in Chapter 4.[12] Graicunas shows that a superior with 5 direct single relationships has 10 cross relationships and 26 direct group relationships, a total of 41. This, according to Graicunas, represents the limit of control of the average executive.

On the other hand, a National Industrial Conference Board survey shows that the executives of succesful industrial concerns control nine subordinates on the average.[13] Although practice here is clearly out of line with theory, there is nothing on either side to point to a definite conclusion. The companies surveyed are designated as successful in their fields, but there is nothing to prove that those companies would not be more successful if their executives followed the rule of Graicunas. At the same time, there is nothing to prove Graicunas' contention that forty-one relationships is the limit of a reasonable span of control.

---

[12] See pp. 65–66.

[13] *Organization Standards and Practices* (New York: National Industrial Conference Board, Inc., Studies in Business Policy No. 18, 1946), p. 15.

10. Exception Principle

The effectiveness of management is improved when executives devote their attention to exceptional matters such as questions of policy and changes in plans, procedures and standards. The "top man in a one-man show" is no executive; his approach to management may be that of a high-grade foreman. Those top managers who know how to select capable subexecutives, and then stimulate their initiative by delegating all but the high-level problems, can relieve themselves of the necessity for carrying home brief cases bulging with "homework." If the chief reserves for individual attention the exceptionally difficult and over-all company problems, his part of the total job will be done better and his working contacts will be improved. He will also be in a better position to give the required study to selecting his subordinates.[14]

11. Delegation

One of the principal purposes of the organization structure is to obtain superior management through the delegation of responsibilities and authority by higher to lower levels of the hierarchy. The principle of delegation must be present in any organization consisting of two or more individuals. When the organization grows to the point where face-to-face leadership is no longer possible, then the chief executive delegates not only the authority to perform specific responsibilities, but he must also delegate the right to delegate, a process known as subdelegation.

Delegation is a method of getting things done through other people. The performance of delegated duties is, of course, improved through the structure of a balanced and coordinated organization. Delegation of duties has two facets of responsibility, that of the delegatee to perform the assigned duty, and that of the delegator to see to it that the assignment is carried out.

Delegation is often a test of leadership, in that the good leader knows what, when, how and to whom to delegate. The lazy leader tends to delegate everything, while the one-man-show type tries to do everything himself. When the organization is properly set up, with a limited span of control, responsibility and authority should be delegated as far down the chain of command as competency can be obtained. Such delegation speeds both executive and production activities by spreading the managerial load. It also promotes initiative and leadership.

---

[14] Refer to the discussion in *Shop Management,* pp. 126–127. Reprinted in Frederick W. Taylor, *Scientific Management* (New York: Harper & Brothers, 1947).

12. Staff

An efficient organization should provide for personnel whose principal functions are to gather and analyze data and make recommendations to line officers. Occasionally, and for brief periods, the staff may supervise when so ordered by the line, usually in connection with installation of a staff-recommended plan. The staff type of leadership support is continuous, personal and positive, in contrast to delegation, which aids the leader by reducing the number of his directing activities. It is not, therefore, applicable to small concerns, where the expense involved would outweigh the resulting benefits.

It is pertinent to observe that some concerns are adapting this principle to a wider field by applying it generally to the entire organization. General staff service, which may be partially decentralized on a departmental basis, is copied from the military. One of its much publicized installations is at Koppers Company, Inc., where it was initiated by retired general Brehon Somervell, president of the company.

13. Authority and Responsibility

The responsibility for accomplishing an assigned task must be accompanied by authority over the means necessary for its accomplishment. A new relationship between authority and responsibility has been developed with the growth of business concerns. When the organization was so small that the boss could maintain direct contact with at least all of his supervisors, if not all his employees, he did not necessarily grant authority commensurate with the responsibility of the assigned task. Because he was able to keep a watchful eye over all activities, he could retain considerable authority over delegated tasks and even entire departments. Under these conditions, it was not surprising that responsibility and authority should not always have been commensurate.

But when the organization grows so large that it must be broken down into functional divisions and departments, then an exact correspondence between authority and responsibility must be built into the organizational structure itself. With the loss of personal contact, top management's direct authority over the entire organization has necessarily given way to functional authority and responsibility. This observation is certainly true in principle, although it is not always recognized in practice.

Not only should authority be commensurate with responsibility; the converse is equally true. The responsibility of everyone who exercises authority should be absolute within the confines of that authority. In other words, on all levels of the organization there should be found a one-to-one correspondence between authority and responsibility. Indeed, this is sometimes referred to as the "principle of correspondence."

Finally, a word should be said about another principle that has been formulated in this general area: namely, the responsibility of the superior for the performance of his subordinates is absolute. This will be seen to be closely akin to the principle of agency in the common law: "Who acts through another, acts through himself."

Subsidiary Principles

The following statements have to do with improving the adequacy of the organization and its structure. Some writers regard them as principles. Whether or not they are entitled to that dignity, they are at least important. Their categorical position is relatively unimportant compared to the guidance they offer in setting up a good organization.

14. Simplicity

Unnecessary elements should be eliminated from all activities, as well as from the processes and procedures established for carrying them out. This principle may seem to be axiomatic, and yet it is frequently violated in practice. Method analysis should be the primary technique for isolating unnecessary procedures in organization, just as it is for simplifying processes. Violation of the principle of simplicity is more prevalent in old organizations than in those newly established. The older ones have had too much time to accumulate the barnacles of pride and empire. Organizational structures must be periodically re-examined and, if necessary, rearranged.

15. Standardization

Organization designs and processes, as well as such factors as materials, quality and effort, should be expressed in the best current standards. Since form should follow function in building an organization, it is only to be expected that the organization structure itself cannot be effectively standardized until quality of products, methods of manufacture or procurement and other primary factors have been determined. These other factors must be simplified and standardized before the effectiveness of the organization for achieving company objectives can be maximized. To a considerable extent in an industrial concern, the design and processes of the organization structure are built on the simplified and standardized products, or objectives, of the company.

16. Specialization

"If practicable, the work of each man in the management should be confined to the performance of a single leading function." [15] This is a corollary of functionalism, which distinguishes among the kinds of duties. Specialization has to do with assignments of duties. It is merely a technical statement of the long-accepted belief that the cobbler should stick to his last. Breach of this principle arises from the human weakness that tempts some men to enlarge their sphere of responsibility so they may cater to their self-esteem. The most notable thing about this principle of specialization,

---

[15] Taylor, *loc. cit.*, p. 99.

other than its evident truth, is the unbelievable number of times it is violated for various reasons.

Like many principles, specialization has its limitations. When carried too far, it becomes a case of rationalizing absurdities. Because a certain degree of business expansion in some specialized field such as oil, steel or shoes may be beneficial to the economy and to the owners of the business, it cannot be assumed that its indefinite expansion will yield continuing benefits. The business might eventually tangle with the government as a monopoly, or topple because of the unwieldiness of its organization. Even machine operations may be so broken down in the pursuit of infinite specialization as to decrease the productivity of the operators from sheer monotony.

17. Continuity

The organizer should provide a structure for future continuity in pursuit of the organization's objective. Most concerns are corporations after they have grown to any size, with continuing legal lives. It is the purpose of this subsidiary principle to point out the relation that should exist between such legal continuity and pursuit of the concern's main purpose. Since it is individuals who give effect to the structure, its future will depend, among other things, on a continuing supply of competent personnel. The guides for such continuing employment should be found in a far-seeing design of the structural elements of the organization.

18. Flexibility

The structure must be flexible enough to provide for organizational adaptation to changing conditions for meeting company objectives. Flexibility may be thought of as the golden mean between rigidity and aimlessness. It bows to the demands of real change, while holding the organization to its established objective. Examples of flexibility in practice are expansion and contraction of an organization to meet increasing or decreasing demands for its product, or changing of product styles to coincide with new desires of customers.

Organizational flexibility is also necessary for adjustment of personnel selection, training and placement to new conditions of availability. Organizations must be flexible because they must be dynamic for survival.

19. Balance

"Each portion and function of an enterprise should operate with equal effectiveness in making its allotted contribution to the total purpose." [16] Balance among functions naturally leads to more effective results. Too often, organizational balance is sought by increasing the number of activities and departments, a plan which is more likely to produce checks rather than balances. The principle of balance warns organizers against expanding organizational minutiae to a point where the costs may be greater than the

---

[16] Urwick, *op. cit.*, p. 121.

gain. Furthermore, the overorganization that may result from insignificant subdivisions may actually impair control. Organizational balance can be effected on a rational basis among organized activities by applying the same common sense used to balance a group of complementary machines. The method used in both cases must be judged by its results.

20. Direct Contact

Slowness of action through the chain of command can be reconciled with the speed requisite for results by establishing special channels for the direct contact of persons responsible for the same type of action process. An example of effective direct contact will best explain the principle involved. It is taken from Sir Arthur Salter's *Allied Shipping Control,* as described by Urwick:

> [Salter] describes how during the last War machinery was established to secure Inter-Allied cooperation in the allocation of shipping. This machinery was very successful. And he attributes that success to the fact that officials in the different countries who were responsible for different aspects of the problem were encouraged to meet each other directly. They did not have conferences on which only the chiefs of departments met: still less were they compelled to negotiate through their respective foreign offices. The people actually engaged on the job, sometimes quite subordinate people, were instructed to meet each other and — within the limits of their functions — to settle issues and to act.[17]

Direct contacts can be developed into a recognized procedure when authorized by the superiors of those involved, who report back their conclusions to those same superiors. It is a technique of management which can be built into the organization, as a substitute for the unauthorized "jumping of channels." Its results are usually more effective because the method employed is operated in the open, by the general consent of those concerned, and in accordance with previously adopted procedures.

Measuring the Organization

One of the outstanding problems of management is to devise plans for increasing the speed of correct decisions. Speed is an element second in importance only to correctness. With increases in the size of business, the layers of supervision increase, slowly leading to organizational elephantiasis, and the technical question of *how big is too big.* One answer is that the concern is unwieldy when its controls start to lose their effectiveness. It is to overcome the increasing problems of business growth that the techniques of organization must be continually observed and improved so that management decisions can be made accurately and on time. To this end, top management should check the following things.

---

[17] *Ibid.,* p. 113.

1. *Is the type of organization suited to its purposes?* The type[18] of organization should be determined on the basis of its main purpose. A military organization, for example, requires a different structure from that of a business concern. A departmental organization usually requires a distinct setup, suitable to its peculiar effectiveness in operation. Church and governmental organizations have evolved from different historical backgrounds and patterns. An industrial concern with scattered plants needs organizational treatment suited to its peculiar problems of operation and control.

2. *Is the division of work on a sound functional basis?* Unless the functional divisions are mutually exclusive there is bound to be overlapping of jurisdictions with consequent confusion. It is also imperative to include all related activities within each main subdivision. Coordination and control aid cooperation and measure results among the various functional divisions.

3. *Is there a proper ratio between supervisors and subordinates?* If there are too few supervisors, expensive delays are the result. Subordinates must wait to consult with their superiors. If there are too many supervisors, some of them are not fully occupied, and unnecessary expense and poor employee morale result. Secondly, subordinates are more likely to cross supervisory channels, seeking the authoritative answers they desire. In the third place, such a situation breeds rivalry among supervisors, with consequent friction and lowered supervisory morale. Finally, too many supervisors with too little work to occupy their time are prone to spend some of their efforts trying to corral more activities in order to justify their existence and enlarge their own sections of the organization, an activity known as "empire-building." Too many chiefs and too few Indians is one of the deplorable features of governmental and most large institutions. It is a sad game and one which subordinates can always tell is going on — to the detriment of the entire organization.

4. *Are departmental objectives clearly defined?* Unless the functional definitions of departments are unmistakably clear, jurisdictional disputes are sure to arise. Departmental objectives are the basis for defining their activities. Both cooperation and coordination are hindered when departmental activity boundaries are blurred. Clearly defined functional zones of responsibility are the basis for delegated authority and the techniques of coordination.

5. *Are authority and responsibility clearly defined and properly delegated?* In general, authority should be commensurate with the delegated responsibility. It should be of sufficient scope to enable effective discharge of the responsibility delegated. Because authority is easily abused, it is sometimes necessary to restrict a person's authority to something less than the normal amount for his particular responsibility, until he has demonstrated that he can use this more limited authority wisely. To establish the desired

---

[18] A discussion of the several possible *types* of organization is postponed until Chapter 8, pp. 141–149.

amount and kind of authority, the delegatee's range of responsibility must be definitely and clearly set forth and properly delegated. Proper delegation includes several factors, chief of which is the right of the superior to delegate the activity concerned.

6. *Are policies clear and properly communicated?* The best way to insure the clarity of policies is to write them down in the form of a manual so that all those concerned will have an opportunity to criticize. Clarity is more likely to result when policy statements are checked during preparation by a group of executives in consultation. Communication of policies is quite as important as clarity of expression. Policies not communicated have little use. If they are known only to their composers they lead to a refined type of rule-of-thumb management. One can scarcely be held accountable for organizational rules of which he is ignorant. From the positive standpoint, good communication, backed by good morale, results in mutual understanding, which is essential to good management.

7. *Are decisions made at the lowest competent level?* This is really a test of the exception principle. Decision-making at the lowest competent level, which means as close as possible to the action level, encourages the exercise of initiative by subordinates and helps prepare them for greater responsibilities. It also reduces the workload of superiors so that they have more time for planning, organizing and controlling the higher tasks for which they should be specially qualified. The executive who has to do routine jobs himself to get them done properly is no manager.

8. *Are expenditures subject to adequate budgetary controls?* This organizational factor can be taken care of in the functional definition of the activities included in the organization. Adequate budgetary procedures must also be provided for in a policy manual or standard operating procedure, to make such controls applicable and effective.

9. *Does the flow of work represent proper functional sequence?* The over-all organizational pattern will furnish an indication of the adequacy of functional sequence. A smooth flow of work and communications, without backtracking, is a measure of good organization. It is essential for effective operations. Functional sequence on the upper organizational levels will furnish the background for effective sequential operations on the departmental level, and finally on the operating level, where it is an important technique of mangement.

10. *Are adequate controls installed and operating?* Organization is a tool whose effectiveness is dependent on its proper use. Controls measure the use of this tool against procedural requirements. All operations must be subjected to controls to test their adherence to established guides and standards. Without technical controls it is impossible to be sure about what is going on or what may be expected in the future. Supervisory guessing or estimating, no matter how much experience the supervisor may have, is purely inspirational. It must eventually bow to judgments based on factual controls.

Conclusions

In all phases of work, good organization is prerequisite to good management. As has been stated before, and cannot be emphasized too often, organization is a primary tool of management. The final test of an organization is, of course, its smooth operation in action. If the executive with a pile of papers on his desk can place most of them in outgoing baskets for attention, with real confidence in the results, he is functioning in a well-planned organization. The following terse observations for practical guidance add life and interest to the more or less dry bones of the principles:

1. To adhere to the substance of organization rather than to worship the form in which it is cast.
2. To view organization as a means to an end, rather than an end in itself.
3. To recognize the values inherent in improvisation, rather than to rely exclusively upon the virtues attaching to organization.
4. To insure liberation of human energies rather than their suppression or regimentation.
5. To respect the authority of knowledge rather than the authority of position.
6. To strive for the maintenance of loyalty on the part of executives to their subordinates, rather than stress the essentiality of the reverse process.
7. To develop well-rounded and intellectually well-balanced executives, rather than one-sided and narrow specialists.
8. To imbue executives with a spirit of tolerance toward one another, rather than permit the existence of conditions productive of intolerance.
9. To inculcate in the minds of executives the wisdom of rendering themselves dispensable, rather than of cherishing the illusion that they are indispensable.
10. To sacrifice almost any other value rather than cause injury to the foundations upon which inspiring leadership rests.[19]

QUESTIONS

1. How would you define organization?
2. To what extent, and how, can you refute the thesis that organization techniques and principles are "theoretical"?
3. By comparing some current business method or procedure with past practice, illustrate the statement: "Some ideas which are common sense in the business world of today may be nonsense tomorrow."
4. What fundamental elements of the framework can be applied equally to the line, staff, functional and committee forms of organization?
5. How would you explain the statement that "form follows function"?
6. To what extent should there be a "separation of the powers" of the various

---

[19] Harry Arthur Hopf, "Evolution in Organization During the Past Decade," *Advanced Management*, Vol. 12 (September 1947), p. 109.

horizontal activities of an organization? What would your answer be as applied to the vertical levels of the hierarchy?

7. What is meant by the impact of structural design on executive performance, and how is it applied?
8. Explain the managerial disadvantages accruing from overorganization and underorganization.
9. What two outstanding advantages result from making management decisions "as far down the organizational line as competency exists"?
10. Explain the differences between the administrative, managerial and operating levels of organization.
11. What typical positions are usually included in each of the five management levels?
12. How would you explain the relationship between communication and coordination?
13. Why is it that morale difficulties may easily develop for the executive assistant idea?
14. Which principle of organization would you consider most important, and why?
15. What is the relation between the functionalism and homogeneity principles?
16. How would you defend the contention that coordination is the fundamental principle of organization?
17. Differentiate, by giving examples, between scalar process and functional classification.
18. Does the exception principle depend on delegation, or vice versa? Illustrate your answer.
19. Explain the relation between responsibility and authority, together with any difference in the application of your answer as it may be applied to large and small businesses.
20. What questions would you pose in attempting to measure the effectiveness of an organization?

CASE PROBLEM

NORTHERN UNIVERSITY

Northern University's Athletic Association is receiving an unusual amount of adverse criticism, with the result that Old Northern is losing prestige among its student body and losing the support of the alumni. The festive spirit of the university's recent centennial celebration was considerably subdued when the football team lost its major annual game. The general reaction among those interested is to fire the coaches and get a new Athletic Committee. There is even some talk of shortening the tenure of the president unless he performs a major operation to cure the malady.

Organized sports are advised and managed at Northern by a series of committees. Chief among these is the Athletic Committee, which coordinates the work of the others. The decisions of the Athletic Committee are carried out by its chairman, who is a member of the faculty.

Among the other committees, the following are outstanding:

The Scouting Committee pays the expenses of a coach to visit the major high school games in the eastern section of the country and report likely candidates to the Athletic Committee's Subcommittee on New Players. This subcommittee is authorized to offer scholarships with free room and board to prospects whom it approves.

The Coaching Committee makes recommendations to the Athletic Committee for renewing contracts, or hiring replacements for those who it feels should be dropped from the staff. It is the policy of this committee to solicit recommendations from the head coach, members of all the teams and the presidents of the campus fraternities. Selection of coaches is made by the Athletic Committee, with salaries subject to approval by the university's Budget Committee.

The Training Committee issues instructions to the head coach on matters of policy, for which purpose it has prepared a manual. It also polices coaching practices to see that its policies are carried out.

Care of the athletic fields is supervised by the university's Department of Grounds & Buildings, which receives recommendations from the Subcommittee on Athletic Fields. However, Grounds & Buildings can use its own discretion whether or not to comply with the recommendations, so that the function of the Subcommittee on Athletic Fields is purely advisory.

Publicity for games is handled by the Advertising Department of the College of Business Administration. Arrangements for the sale of tickets for all games are taken care of by the Purchasing Department of the Business Manager's Office, which also buys all uniforms and other equipment and supplies for the Athletic Association. The reason for combining these two activities in the Purchasing Department is to allow for the possibility of business persuasion in the purchase of blocks of tickets for minor contests by the university's vendors.

Concessions for the games are in charge of the Bureau of Student Self-Help, which reports to the Dean of Men. The director of the Bureau has final authority for the distribution of concessions, the income from which goes to the social fund of the Student Council.

By order of the Board of Trustees, half of the receipts from football and baseball games are budgeted for the support of the minor athletic teams. These funds are allocated to the individual sports by the university's Budget Committee, on the basis of estimates submitted by several subcommittees (one for each of the minor sports) of the Athletic Committee. In general, the requests for funds are about double the amount available for the purpose.

The Athletic Committee of eight members was selected originally, for two-year terms on a staggered basis, by the president of the university. One-half of the committee retires each year, and their successors are chosen by the remaining members. Since retiring members are allowed to succeed themselves, the committee has become self-perpetuating. The Athletic Committee membership has been the same for years because the holdover members have continued to re-elect the retiring members to succeed themselves. Further inbreeding has been brought about by the chairman's practice of appointing his fellow committee members to the several subcommittees which the Athletic Committee supervises. He has explained this policy as an attempt to achieve coordination through the top committee.

The low ebb of the athletic program from the standpoint of losing intercollegiate games has disgusted both the student body and the alumni. The Alumni

Association has served what amounts to an ultimatum on the president of the university: either he correct the situation, or a face-to-face appeal will be made to the Board of Trustees at its next meeting.

PROBLEM. The president of Northern has a real problem on his hands. He received his doctorate in education thirty years ago, and finds nothing in his training or experience to assist him in this dilemma. He rightly feels that it combines problems in both organization and management, but he is at a loss as to how he should proceed to correct the situation. What do you recommend? Draw an organization chart of the Athletic Association as it now operates and another containing your suggested revisions. Explain why you have made the detailed changes. Point out the fundamental reasons, from an organizational standpoint, why Northern University has been a consistent loser on the athletic field.

CHAPTER 8

Organization Techniques

Fundamentally, organization divides the functions of an institution into distinct and unrelated activities, so that each may attain the efficiency which follows repetitive specialization of effort. Coordination then draws together these separate functions into a smoothly operating unit. Finally, control measures the results of the separate functions, and of the subdivision of which they are the components, by testing their operations and results against accepted standards. The separate functions are guided in their operations by an established system, which has been referred to previously as the mechanism set up to guide the operations of a group of activities. The essence of system is paper-work, which is referred to as "red tape" when it is unnecessarily cumbersome for accomplishing its purpose.

Practical planning and operation of a new organization, or the revision of an existing one, include the following fundamental steps:

1. Determine its objective or objectives
2. Study the means for obtaining the objective
3. Prepare plans for accomplishing the objective
4. Carry out the plans in actual operation
5. Observe and control the results
6. Make improvements suggested by observations

In this series of steps, thought and the necessary tools are required. One of those tools is the organization chart.

The Organization Chart

The chart is the structural design of the organization. It is a static picture of a group of dynamic activities, which must be coordinated to attain success. A static picture cannot properly represent the pulsating operations of an organization in action. However, as a guide and standard it is important. It is often said that a harmonious group of qualified executives can achieve success without a planned organization. But a group of harmonious executives has an organizational plan even if it has never been reduced to graphic form. Furthermore, an uncharted organization is headed for trouble when one or more of its leaders fades out of the picture. Organizations must be charted for possible changes, so that shifts in personnel do not leave the organism gasping. They must also be planned for progress, otherwise they may take the uncharted course of atrophic demise.[1]

Organization is one of the chief functions and principal tools of management. When the organizational setup is "understood" but not charted, results cannot help being unsatisfactory unless the concern is very small. A recent survey[2] of eighty-five universities revealed that 51 per cent did not have organization charts. The reasons were given as "too small," "unnecessary," and "makes operations too formal," which means that the ultimate in management flexibility was considered the prime requisite. But like most desirable attributes, flexibility can be carried too far.

Another important consideration is the age of an organization chart. The average chart of institutions of all kinds has nearly reached, or just passed, its fifth birthday. Some are framed, which often endows them with nothing but historic interest. Since successful concerns are dynamic, their organizational plans are truly representative only after the necessary changes and corrections have been made on their charts. One commentator has aptly suggested that the only thing more out of date than last year's organization chart is yesterday's newspaper. The most effective plan for keeping charts, as well as organizations, up to date is the periodic organization audit or survey. To be objective, and therefore effective, it should be done by someone outside the organization. In addition, outside audits are more likely to be made by skilled operators who understand the principles of organization and the approved methods of chart drafting.

Charts do not necessarily signify good or poor organizations. Many charts do not correctly picture their organizations. Only an organizational survey can determine whether or not the chart is correct. They may be purposely dishonest; those who made them may not have understood the principles of organization or the techniques of chart drafting; or they may be merely fuzzy representations of what they purport to picture. All of these charts defeat the purpose of guiding operations, while the very fact of their existence, however inaccurate they may be, blinds management to the need for revising them.

Chart-making

The mere process of charting an organization has beneficial results for the management group that takes part in its consideration because:

---

[1] Leslie M. Slote explains the activity-analysis chart and its superiority over the ordinary organization chart in "Why Organization Charts Don't Work," *Management Methods* (March 1955), pp. 9–11.

[2] Henry G. Hodges, "Management of Universities," *The Southern Economic Journal*, Vol. 19 (July 1952), pp. 79–89.

1. It requires all executives to give thought to the responsibilities and authority assigned to their position. This new awareness cannot help improving their methods and operations.

2. It also requires each executive to become familiar with the roles of the other members of the management group. This information leads to improvements in the relations with his superiors, peers and subordinates. It is frequently the beginning of a cooperative spirit, which always adds to the effectiveness of the management team.

3. It occasionally leads the members of management directly to a study of the principles of organization, and indirectly to a consideration of the principles of management. It is an excellent method of executive training because individual efforts are applied to specific over-all company problems.

4. It promotes management morale because the members of the team acquire a clearer understanding of their duties and relationships as members of a charted organization. This factor improves management morale all down the line.

Chart forms

Organization charts take many different forms and the form to be used will depend largely on the personal preferences of the chart-makers. The methods for showing subordinate and functional relationships, however, are more nearly standardized. The following pages will illustrate and explain the most typical chart forms.

First, is the *pyramidal* chart, illustrated in Figure 8.1. This form has the advantage of being simple, clear and easy to understand. In emphasizing the single and direct relationship between the superior and his subordinates, it minimizes the tendency to get lost in a tangle of tangential relationships — something which frequently happens in amateur efforts at chart-making. In its elementary form it shows only the organizational relationships of the management group. This form is commonly used in the simple line form of organization, with or without functional divisions or staff agencies, as will be discussed later in this chapter.

The *vertical chart,* also illustrated in Figure 8.1, is used to advantage where space-saving is important. Whether it is more or less clear than the pyramidal form depends on the individual reaction.

The *horizontal chart* form is also illustrated in Figure 8.1. It is believed by some members of management to be more easily understandable than some of the other forms. Whether this is actually the case is also a matter of personal choice.

The *circular chart,* illustrated in Figure 8.2, is having some recent vogue. It is claimed that showing the functional relationship in concentric circles, which represent levels of authority, minimizes the psychological frictions among executives on different organizational levels, thus tending to eliminate the "emotional aspect" of the pyramidal form. The circular chart depicts the flow of authority outward in all directions. Another version of this

FIGURE 8.1

Organization Chart Forms

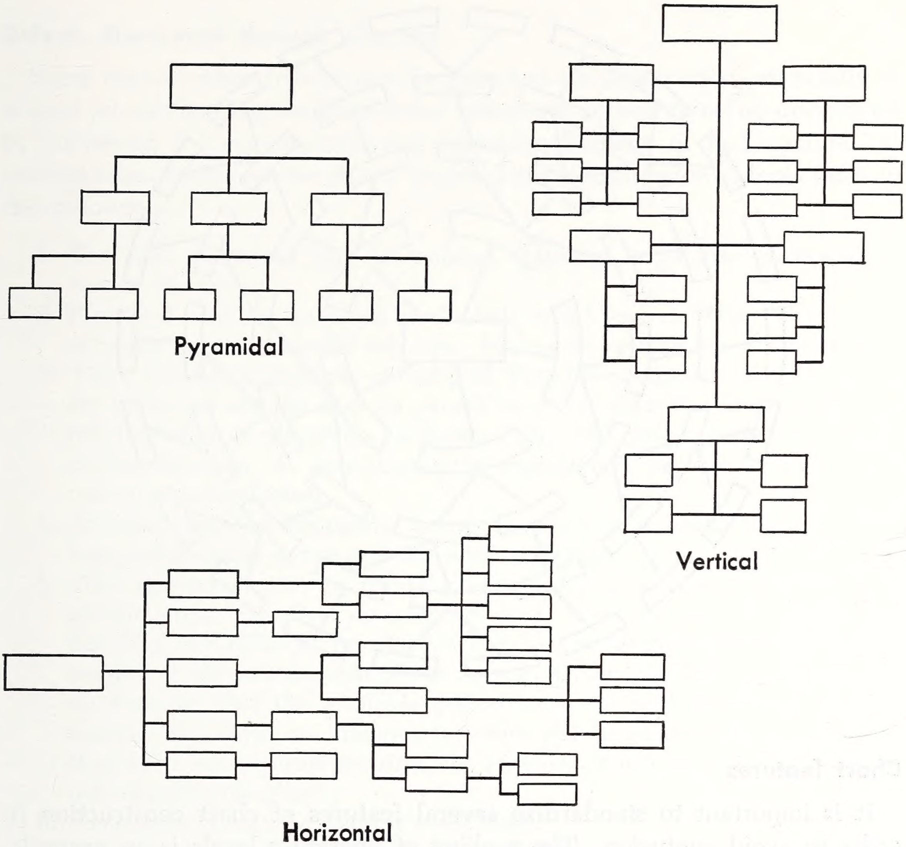


chart form is semicircular, with the president's position located at the center of the diameter.

Large organizations may require a series of charts. The covering chart depicts the broad skeleton of the organization, while subsidiary charts illustrate breakdowns of the individual functions shown on the over-all chart. Many governmental agencies must resort to a series of charts. Because of the multiplicity of their functions, changes occur more often than with small organizations, so that the charts-in-series must have periodical correction sheets.[3]

---

[3] The Wright-Patterson Air Force Base at Dayton, Ohio, requires monthly chart issues to picture its organization, comprising some thirty thousand employees. Monthly issues become more necessary when the name and phone number of the activity leaders are shown, because the turnover in personnel is, of course, more rapid than changes in organizational positions.

FIGURE 8.2

Circular Chart Form

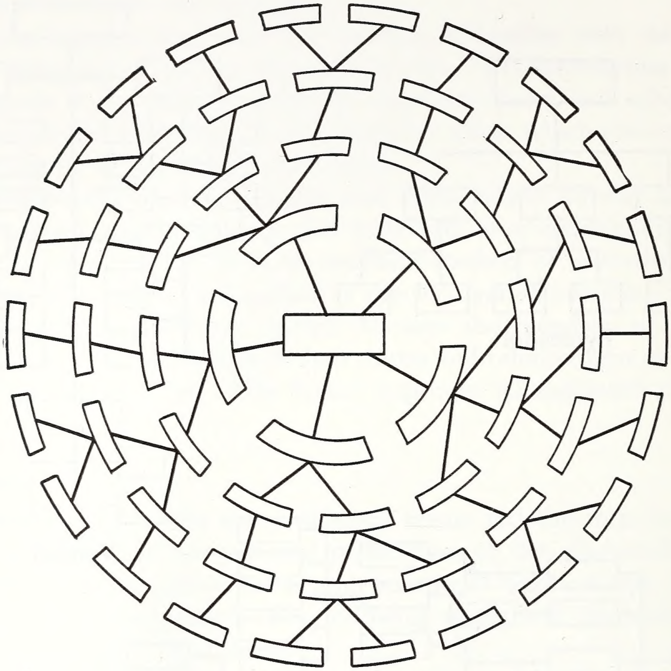


Chart features

It is important to standardize several features of chart construction in order to avoid confusion. The ranking of operating levels is an example. One such ordering of levels on the basis of authority consists of department, bureau, division, section and unit. The names of the levels are not so important as long as they are used consistently. Squares and circles may be used to designate different degrees of responsibility and authority. Also, it is customary to use solid lines to show the chain of command and dotted lines to indicate advisory or staff relationships. Another way of graphing staff agencies is to place them to one side of the line functions they serve, in which case the solid line is also used on some charts. All such types of indicator should be explained in a chart "key."

It is important, for the purpose of locating flaws in the organization, and for clearly indicating grades of authority, to divide the chart into levels of responsibility. These levels should be applied to both the corporate and the management groups. The corporate group includes stockholders, directors, president, secretary and treasurer. The skeleton of management levels comprises the president in his operating capacity if he holds that executive position, functional directors, vice-presidents, plant managers, superintendents and foremen, in descending order. The workers make up the final group, but it is not customary to picture them on the organization chart.

Defects discovered through charting

Some organization defects can be detected by observation, especially if a good job of charting has been done, but many defects must be discovered by surveying the organization and matching findings of fact against the relationships shown on the chart. Outstanding organization defects include the following:

1. The span of control may be violated, throwing impossible workloads on certain executives.
2. Functions may be improperly divided, which occurs when the plotted activities are not mutually exclusive, leading to overlapping of functions.
3. There may be an improper stressing of the relative importance of functions. An important activity may be placed on a low executive level, while one less important is placed on an upper level. This defect is certain to be a morale destroyer. It also throws the organization out of balance from an operational standpoint.
4. Activities may be illogically arranged, resulting in assignment of unrelated subdivisions to one and the same authority.
5. The same person may be handling unrelated functions, an obvious organizational error. Situations do arise, however, where one person is capable of handling two different functions, which are so assigned because it is impossible to obtain a capable person for one of them. In this case, expediency recommends that the available person supervise both functions, at least temporarily. However, the two functions should be charted separately so that when the opportunity arises, the personnel setup can be adjusted without changing the chart.
6. Some activity may be entirely overlooked.
7. Relatively minor functions may be duplicated.
8. Functions may be improperly assigned from the standpoint of personal capabilities. Inspection reveals mediocre men in important positions, or the reverse, a defect which is far from uncommon. It can be spotted only by matching personal qualifications against function specifications. This defect is also a first-class morale destroyer.
9. Functions may be split, resulting in confusion, and hindrance to effective coordination.

Types of Organization

Although the organization structure differs widely in various lines of business, and even among different concerns in the same line, there are four plans generally recognized as fundamental.

The line type

The line form of organization, also referred to as the military type because of its wide use by the army prior to the addition of staff services, is the oldest form. It is simple and clear cut in that its chain of command is direct, each link being considered capable of managing all functions that support its command level. The pyramidal chart form as shown in Figure 8.1 illustrates this organizational type. Line organization appears very early in the recorded history of warfare and has been a form favored down through the ages by autocratic military and political institutions. Today, its use is largely confined to small organizations, where it is generally found to be effective.

There are two outstanding characteristics of the line organization. First, each individual reports to only one superior. Second, its divisions are not supported by any kind of staff or service assistance. For example, the production division performs its own personnel, maintenance and other auxiliary activities. The same plan is followed by finance, sales and other divisional operations. This practice naturally results in a duplication of small service groups.

The following advantages and disadvantages may be observed in operations under the line type of organization:

Advantages

1. It is simple and easily understood.
2. It is adaptable to quick decisions and action.
3. Authority and responsibility are clear.
4. Discipline is easily maintained.
5. Its simplicity encourages stability.

Disadvantages

1. It is relatively inflexible.
2. It often leads to one-man autocratic rule.
3. An impractical span of control is developed.
4. Cooperation and coordination tend to be minimized.
5. Lack of specialization produces inferior operation.
6. It forces too much planning on the work level.
7. It tends to resist improvement.
8. It often delegates responsibilities with inadequate authority.

Autocratic rule under the line organization makes for poor management, except in small concerns, chiefly because of its tendency to produce unrealistic spans of control. It also engenders laxity in the delegation of reasonable responsibilities or commensurate authority, or both. Besides having an adverse effect on management morale throughout the organization, it places the chief executive in a position where he wears out his mind and body as fast as his welcome.

Line-and-staff type

The primary purpose of staff service in a line-and-staff organization is to aid the line with information and advice. The staff idea probably developed as a technical service in the military, where a growing multiplicity of weapons and services expanded beyond the capacity of line officers to give adequate attention to them. Aides, or staff officers, took over problems assigned to them by line officers, to whom they were subordinate. An ancient Roman military staff office located the camp site (*castra*) or quarters, and prepared it for the troops. Subsequently, when the military added food and clothing responsibilities to this staff service it became the quartermaster's department — literally, master of troop quarters, formerly referred to as castramentation.

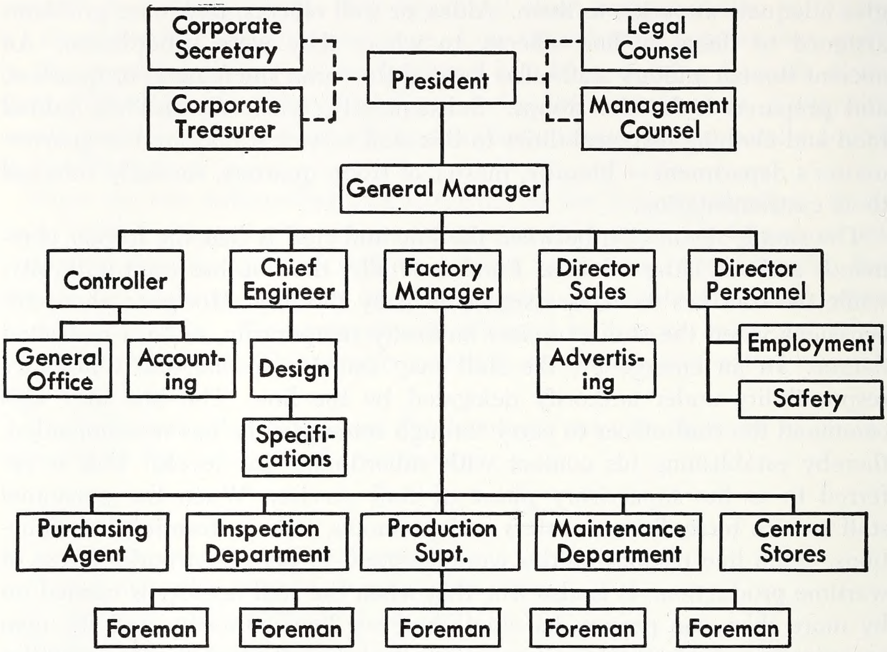
The simple distinction between the line and staff is that the former commands and the latter advises. Fundamentally, the line has total authority, while the staff has its tasks assigned to it by the line. However, there are occasions when the staff exercises authority temporarily, or to a restricted degree. In an emergency, the staff may exercise special and temporary responsibility under authority delegated by the line. The line may also command the staff officer to carry through some plan he has recommended, thereby establishing his contact with subordinate line levels. This is referred to as the supervisory phase of staff service. When the personnel staff service hires, fires, transfers and promotes, it is performing line functions. Such line responsibilities were assigned to personnel under stress of wartime production. It is also true that when the staff activity is carried on by more than one person, its chief exercises line authority over his own organization. Individual or group staffs may be attached to line activities at any number of organizational levels.

Staff services may act independently in the interests of the function to which they are attached, or the various staff services may be organized in a hierarchy of their own, always subordinate to the line service to which they are assigned. This form of staff organization is particularly useful when one of its services is to infiltrate company doctrine throughout the organization.

The complexities of modern business, especially of industry, have caused a recent expansion of the staff-service idea, resulting in some confused relationships between line and staff officers. Confusion may develop because of the many kinds of leaders. Some look with such favor on the staff function that they are inclined to lean on it to the point where it becomes a crutch. At the opposite extreme is the executive who is distrustful of an organizational technique to which he was opposed from the beginning. He is likely to make few staff assignments, and then not use the advice which they offer. Somewhere in between is the correct balanced use of staff services. In any case, it is fruitful for line and staff officers to appreciate each other's points of view. The extent to which the line officer needs staff service, and the nature of that service, depends primarily on the functions of the line activity concerned. For example, the director of sales in a wholesale concern may consider it important to check his prices against the trends in the market. The desired information may be collected, analyzed and submitted by a

FIGURE 8.3

Line-and-Staff Organization


Corporate Secretary
Corporate Treasurer
President
Legal Counsel
Management Counsel
General Manager
Controller
Chief Engineer
Factory Manager
Director Sales
Director Personnel
General Office
Account-ing
Design
Specifi-cations
Advertis-ing
Employment
Safety
Purchasing Agent
Inspection Department
Production Supt.
Maintenance Department
Central Stores
Foreman
Foreman
Foreman
Foreman
Foreman

staff employee, based on competitors' selling prices. Gathering the data may be more difficult than analyzing it; it is a time-consuming task which any busy line officer can well afford to shift to a staff member who enjoys and is experienced with such problems.

The line-and-staff plan is adaptable to medium-sized and large organizations. It would be cumbersome and expensive for a small concern. Reference to Figure 8.3 will aid in understanding some of the advantages and disadvantages of the line-and-staff type of organization.

Advantages

1. It provides for the advice of specialists.
2. It eliminates the confusion of multiple bosses.
3. It provides additional supervision in emergencies.
4. It relieves executive burdens.

Disadvantages

1. It can promote jealousies between line and staff.
2. Its undue centralization promotes staff "authority."
3. It decreases initiative in some line activities.
4. It requires a high degree of executive cooperation.

Most of the disadvantages of this form of organization can be overcome by complete written understandings about the respective duties of line and staff officers. These delineations can be made clear in the functional definitions of their spheres of operations, and even more so in the manual for executives. When the various executive activities are set up on a functional basis, and the personnel employed are qualified and properly assigned, the line-and-staff type of organization is the best that we know about at this time.

Functional type

The functional plan of organization is derived from Frederick W. Taylor's functional foremanship. Taylor analyzed the foreman's duties into eight distinct activities. Because he reasoned that no foreman could handle all of these adequately, he devised the plan of functional foremanship, by which individual supervisors were assigned to each of the eight activities so that the worker would have the advantage of specialized supervision. Under this system each worker reported to the eight specialists for the various phases of his work. Figure 8.4 indicates the operation of Taylor's functional foremanship plan.

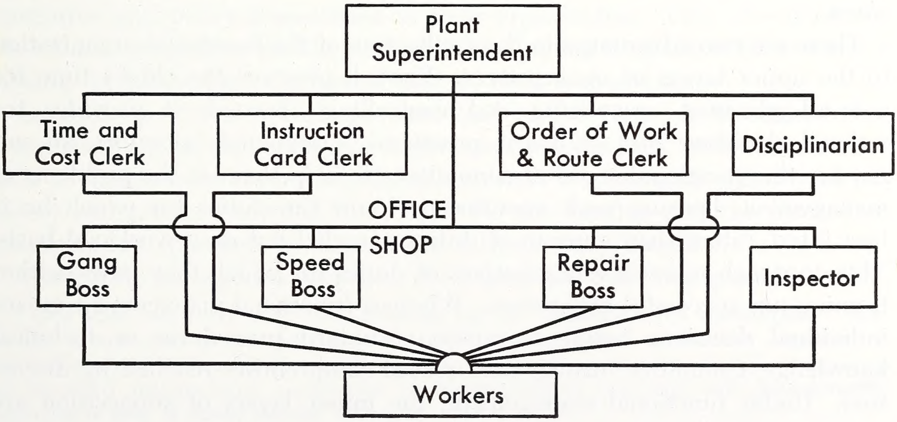
Taylor's purpose was to divide the total supervisory task so that each foreman would have a single activity, to insure the superior results that follow specialization. It can be seen from the functional diagram that the worker is most concerned with the lower group of "bosses," the gang, speed, and repair bosses and the inspector. His contacts were less frequent with the other four — the time-and-cost clerk, instruction-card clerk, order-of-work and route clerk, and the disciplinarian. The advantages and disadvantages of Taylor's plan follow:

Advantages

1. Division of function is based on specialization.
2. Planning is separated from manual work.

FIGURE 8.4

Taylor's Functional Foremanship Plan



3. Subordinates are assured better supervision.
4. Functional foremen are easier to train.

Disadvantages

1. Lines of authority over workers are divided.
2. "Buck-passing" is encouraged among the foremen.
3. Personal differences develop among the specialists.

Chiefly because of the confusion produced among the workers by multiple bosses, Taylor's plan is seldom found in use today. He felt that eventually his idea would be applied to all layers of management below the top executive. The higher up the management ladder the plan is extended, the greater is the resulting confusion and resistance because of the nature of the work and the greater articulateness of subexecutives. It seems impossible, in our present human and organizational development, for several supervisors to exercise authority over the same group of subordinates without jurisdictional clashes that do more harm than their specialized contributions can compensate for.

In spite of its weaknesses, Taylor's philosophy of functionalism made a distinct contribution to the field of organization. It led to the development and successful use of various types of functional staff services on an advisory level. Although general practice has demonstrated the difficulties connected with the assumption of line authority by functional staff specialists, nevertheless the plan has been found useful under special circumstances. Also, the application of functionalism to the line-and-staff form of organization has greatly improved its effectiveness.

The functional manager can be understood by comparing him with the staff man in a line organization. The latter investigates, decides and recommends, and if his recommendation seems to be a good one, the line boss issues an order based on it. The functional operator performs the same tasks as the staff operator, but he also issues the order in his own name. However, his decisions are based largely on standard practices and procedures, rather than on personal or group opinions related to individual cases.

There are two advantages in the application of the functional organization to the upper layers of management. First, it reserves the chief's time for over-all planning, organizing and controlling. Second, it provides for rational decisions and standard practices. Functional operators do not require the questionable aid of committees to help them in the problems of management, because each operator performs the duties for which he is best fitted, rather than a group of duties parceled out on a workload basis. This approach relieves subexecutives of duties for which they have neither training nor successful experience. Whereas functional management means individual decisions based on written standard procedures or technical knowledge, committee management means compromises reached by discussion. Under functional management, the upper layers of supervision are more hemmed in by standards, but in those less routine matters not covered by accepted standards they have more real authority. What is more important, they have more time to perform leadership functions representative of their highest skills.

The committee type

The committee can only marginally be termed a type of organization since it is usually attached to one of the other three organizational plans. It is conceivable that an institution can be managed by a group of functional committees, coordinated by an executive committee, but the plan is unusual in its pure form. However, committees are used so extensively in connection with the other organizational forms that they must be considered here.

There are several kinds of committee, variously referred to as executive, policy, management and advisory. The functions of the *executive committee* are, or should be, set forth in the organizational manual. In general, its duty is to assist or guide the chief executive in the over-all coordination of the enterprise. It is customarily made up of those members of top management who are capable of guiding the concern's activities within its established policies and toward the accomplishment of its objectives.

The *policy committee* makes top policies for the guidance of executive officers in performing their functions. It is usually composed of two or three executives and an equal number of directors. Where either executive or policy committees are found below the top level of administration or management, their decisions are circumscribed by policies, rules and regulations from above.

Executive and policy committees arrive at those useful decisions which invariably flow from the consultation of individuals who are skilled in the subjects they consider and interested in common objectives. It should be observed that although executive and policy committees do not directly manage any function or activity, their decisions are "law" for those whom they affect. Many concerns could improve their management by adding executive and policy committees to their organization. It is also probable that many companies use the executive and policy committee plan without having established it as a formal part of their organization.

In addition to the useful executive and policy types, it is evident that many institutions, especially the larger ones, are plagued with committees.[4] It is advisable from several standpoints to have a reasonable number of advisory committees provided their fields do not overlap and the committee members are qualified to discuss the subjects they consider.

For purely managerial purposes, the committee most recognized as effective is the committee of one. General Goethals once observed, in discussing managing boards, that "they are always long, narrow and wooden." Although he was probably an autocrat in that he liked to make his own policies as well as execute them, his observation is largely valid. One defense offered for committee management is that it is "democratic." But it is debatable whether democracy is served by the questionable or compromise decisions or actions of groups whose members are not qualified to consider intelligently the subjects they discuss.

---

[4] One state university with 8000 students has 37 "administrative committees." Normally, administrative committees would determine policies, which the organization manual shows is not true in this case. They are management committees. The prevalence of so-called management committees in large business concerns and governmental agencies is only of lesser degree.

Leeds & Northrup claim to have used committee management for the past fifteen years, but considering vice-president C. R. Cary's description of its operations,[5] one is forced to the conclusion that their committees advise rather than manage. Mr. Cary points out three weaknesses of their so-called committee management: first, "committee management, from its very nature, undeniably tends to be cumbersome. . . . "; second, "committee management may tend to use time inefficiently"; and finally, "a committee may tend to be argumentative, with consequent waste of time."

In a recent book, William H. Newman suggests that "there is probably no administrative device more commonly abused than this one," referring to the committee. He also feels that "it is an opiate taken in lieu of effective administrative action." [6]

The following observations may be characteristic of both management and advisory committees. They are argumentative, slow and expensive, and they divide responsibility to the vanishing point. They often lead to compromise decisions that are temporary at best and, at their worst, are nothing but log-rolling to achieve a compromise between conflicting selfish interests; either way, the contribution that such decisions will make to the attainment of the concern's over-all objectives is rarely uppermost in the minds of the committee members. To the extent that committee decisions dilute individual responsibility they also stifle individual initiative.

Counting committee noses is neither a democratic nor a scientific process. It frequently enables the numerical majority to serve selfish interests, even to the extent of perpetuating its dictatorial status. The old aphorism that two heads are better than one can be a mathematical fraud. It may or may not be true, depending on what is in the heads. The validity of committee decisions is not enhanced by any number of unintelligent opinions. A valid consensus results from the meeting of minds equipped to deal with the question or problem concerned. If the subject is of a general nature, opinions based on general knowledge may be fruitful; if the problem is specific or scientific in nature, fruitful opinions come only from those with specific or scientific training and experience.

There is another undesirable facet of advisory committees — there are too many of them. If the concern is overorganized, or if there is an ac-

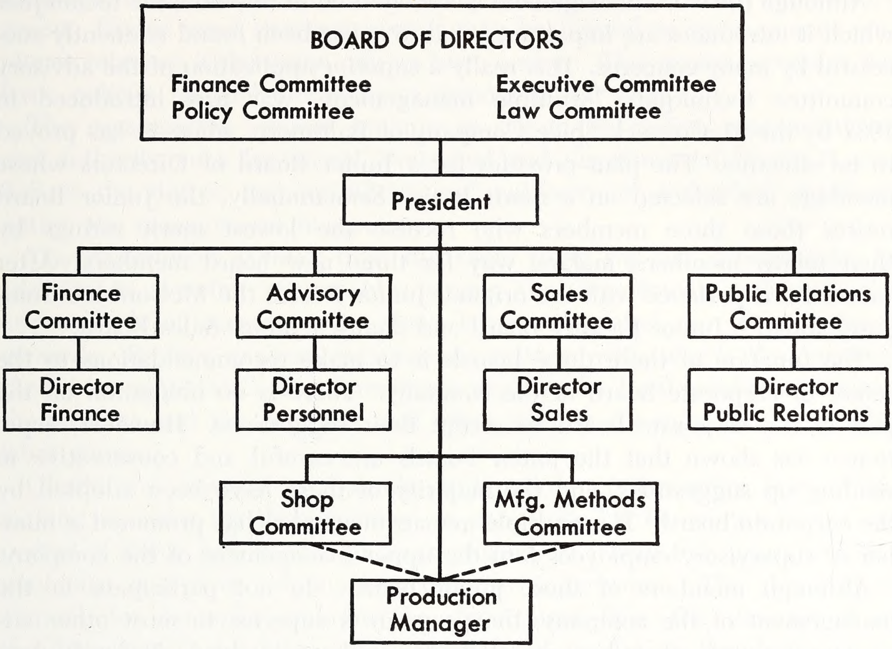
---

[5] "Certainly We Like Committee Management!" *Advanced Management,* Vol. 16 (September 1951), pp. 2–3.

[6] *Administrative Action* (New York: Prentice-Hall, Inc., 1951), pp. 217, 218.

FIGURE 8.5

Committee Plan of Organization


BOARD OF DIRECTORS
Finance Committee
Policy Committee
Executive Committee
Law Committee
President
Finance Committee
Advisory Committee
Sales Committee
Public Relations Committee
Director Finance
Director Personnel
Director Sales
Director Public Relations
Shop Committee
Mfg. Methods Committee
Production Manager

cepted technique of establishing committees to check the decisions of other committees, the committee chain of adequacy may become so long as to weaken even a good committee plan. Many of the problems handled by advisory and managerial committees are of a recurring nature, and could be handled better by an individual guided by a manual of standard procedures. Figure 8.5 shows the application of committees to a line-and-staff organization.

For effective committee operations, the following rules should be observed:

1. Committee membership should be limited to the number which can operate effectively. Too many members are likely to waste time. Committees of three to five members have been found desirable.

2. An agenda for committee meetings should be prepared by the chairman well in advance of meetings and distributed to its members before meeting time. The agenda should list items for consideration in the order of their importance.

3. Committees should have definite beginning and closing times, determined in advance, so that important matters will be decided, and dalliance reduced to a minimum.

4. The chairman should hold the reins and use them to keep discussion on the track and aiming toward conclusions.

Multiple Management

Although the word management is loosely used in this title, the techniques which it introduces are important because it has been found eminently successful by many concerns. It is really a superior application of the advisory committee technique. "Multiple management" was first introduced in 1932 by the McCormick Spice Company of Baltimore, where it has proved to be effective. The plan provides for a Junior Board of Directors whose members are selected on a merit basis. Semiannually, the Junior Board retires those three members who receive the lowest merit ratings by their fellow members, making way for three new board members. After successful experience with the original Junior Board, the McCormick Company added a Junior Factory Board and finally a Junior Sales Board.

The function of these three boards is to make recommendations to the senior or corporate board of the company. There is no obligation on the part of the corporate board to accept their suggestions. However, experience has shown that the junior boards are careful and conservative in sending up suggestions, and the majority of these have been adopted by the corporate board. The multiple-management plan has promoted a number of supervisory employees into the upper management of the company.

Although members of these junior boards do not participate in the management of the company, the program is superior to most other advisory-committee plans because of the psychology involved. Not only does multiple management benefit the company from the standpoint of the employee members of the junior boards, but it also improves the morale of the rank-and-file employees. They feel that through the junior boards they have a direct approach to top management and the corporate policy-determining group. Men in the lower ranks of supervision have risen to membership on the corporate board. Furthermore, many of the suggestions of the junior boards have been highly beneficial to the company's operations. For obvious reasons, it would be difficult to establish the junior-board system in a company with a strong and antagonistic union.[7]

Manuals

Because it is impossible to tell the entire organizational story on a picture or chart, it is advisable to fill in the gaps by more complete explanations. This is the purpose of the manual. It brings a static picture to life. Because the interests of the various management levels are focused according to their responsibilities and authority, it is advisable to prepare manuals accordingly. The *policy manual* is primarily intended for top management, although its contents should have some interest for the entire supervisory group. Under some circumstances it may be helpful to management–employee relations if the union officers have a copy. This manual contains the basic policies for such functions as personnel and sales.

---

[7] The author organized and helped operate a junior-board installation during the first year of its existence for the Dayton (Ohio) division of the National Tag Company. From that experience it was concluded that this keen tool must be used with great discretion during its initial period. If it gets past the first year as an accepted improvement by the lower supervisory group and the rank-and-file employees, it will probably become an established institution of great merit.

The *organization manual* explains in detail the duties, responsibilities and authority on a functional, divisional and departmental basis. It also defines the duties, responsibilities and authority of individual positions within the management hierarchy.

The *department manual* does the same thing for the departments, in addition to showing relationships among the departments and with the upper levels of management. Many large companies also issue *foreman manuals.* Besides general organization matters with which the foreman should be acquainted, they sometimes explain the legal relations between the workers and the company and often include the agreement with the labor union.

Charts and manuals are merely explanations of the entire framework, making it easier for the personnel to cooperate by knowing what is expected of them, how it can be accomplished, to whom they must look for guidance, and over whom they exercise supervision. The department manual, for example, includes the department title, the description of the department's function and a summary of its duties, the duties of its chief, and its working relations with other departments. It also names and describes the department's subdivisions, with details similar to those given for the department.

The preparation of these manuals requires the cooperative effort of many employees. It is a laborious but interesting job because the manuals must dovetail with the organization charts. Preparation of manuals, which normally follows completion of the charts, may lead to corrections and changes. This work cannot help profiting the people who take part in it. Their interests may be stimulated periodically as charts and manuals require re-examination and revision. The work involved in putting together the parts of this management machine invariably leads to operating improvements in it.

What are some of the auxiliary advantages which flow from the use of the chart-and-manual guide?

1. It definitely fixes responsibilities and authority.
2. It specifically defines functions and duties.
3. It substitutes written for oral instructions.
4. It minimizes "buck-passing."
5. It paints a complete picture of the organization.
6. It improves management classifications and salaries.
7. It aids in budget planning and cost determinations.
8. It is a solid basis for rational organization changes.

Standard Practice

Standard practice instructions, also referred to as "standard operating procedures (SOP)" and "standard practice procedures," are written guides for carrying out the activities included on the organization chart and explained in the manuals. They are also issued for guidance in performing work or operations. Charts, manuals and standard practice instructions encompass organizational and procedural operations. The omission of any one of these three weakens the organization and the operations which it prescribes.

> It is readily seen that the organization chart tells "where" in a company a function is placed, the organization manual tells "what" the detailed nature of the function or position is and indicates its relationships to other functions and positions, while the standard practice instruction tells "how" the functions are to be carried on and the duties and responsibilities are to be discharged.[8]

Standard practice instructions are necessary for training both new and old employees. They are doubly important when they cover several closely related jobs, some of which are feeders to the end product of a group of activities. Figure 8.6 is an example of standard practice instructions.

Standard practices represent the best known methods at the time they are compiled. They must, like the chart and the manual, be subjected to periodic examination and improvement to meet changed conditions. Current issues of standard practice instructions should be handy for ready reference and even when they are outmoded they should be kept for possible future reference. It may seem unnecessary to retain the outmoded issues, but they have a practical use in preventing changes to methods that have already been tried and found wanting. From this standpoint, they save duplication of mental effort of a high order.

What are some of the advantages of standard practices?

1. They give the worker a detailed picture of how to proceed with his job. They not only save the worker's time but frequently provide answers beyond his own ability to analyze and plan.
2. They provide a means for employees on similar work in scattered branches to do their jobs according to a uniform pattern, and in the one best way known at the time.
3. They save analysis and planning time of supervisors all down the organizational line.
4. They fix responsibility for procedural and operational errors.
5. They aid in determining costs and analyses.
6. They stimulate the thinking of everyone who takes part in compiling them, thus leading to further possibilities of improved methods and procedures.
7. They increase productivity and reduce unit costs.

---

[8] L. P. Alford and John R. Bangs, *Production Handbook* (New York: The Ronald Press Company, 1948), p. 58.

FIGURE 8.6

STANDARD PRACTICE INSTRUCTIONS

(For Purchase Orders)

I. Purchase Order shall be issued on National Standard Purchase Order form of the National Association of Purchasing Agents.

II. The Purchase Order form shall be made up in ten copies, and distributed as follows:

1. Original shall be sent to the Vendor;
2. Acknowledgement copy shall be sent to the Vendor, for acceptance of the order, and signifying of delivery date;
3. Copy for the Procurement Department file;
4. Copy for the Receiving Department as notice to expect the order (purchase);
5. Copy to the Accounting Department as notice to charge commitment to proper budget account, and for subsequent reconciling with invoice;
6. Copy to the department making the requisition as notice of compliance with request:
7. Copy for Procurement's expediter for use as follow-up;
8. Copy to the Inspection Department for use when notified to inspect by the Receiving Department;
9. Copy to the Costing Department;
10. Copy to Materials Control for Central Stores' records.

8. They conserve supervisory time for planning improvements and controlling operations.

Conclusions

The organization structure is the framework through which management activities circulate. Ascending information and descending orders are outstanding examples of the necessity for free circulation throughout the organization. It is important that communications move expeditiously in all directions through the entire framework to obtain intelligent cooperation and effective effort. In spite of the flow of decision-making through main channels, it has been found beneficial for corresponding subordinates on the same level in different vertical channels to deal directly with each other, provided they maintain the established relationships with their superiors. Here again, we see the fundamental organizational relationships being maintained while providing for faster horizontal decisions.

Without organization no plan requiring the participation of two or more people could attain success except by mere chance. Without techniques for setting the organization in motion, the effectiveness of any organization falls short of its possibilities. Organization is a function and one of the primary tools of management. Its effectiveness is a distinct aid to leadership. The combination of good organization and capable leadership is one of the deciding factors for attaining any objective.

QUESTIONS

1. What is the purpose of organization?
2. Is it more difficult to plan a new organization or revise an existing one? Why?
3. To what extent is there a dependable relationship between the chart and the organization it purports to represent? Which is static and which is dynamic?
4. Explain three reasons customarily given in defense of the failure to prepare an organization chart, and criticize them.
5. Why should one be skeptical of an organization chart?
6. What are some of the advantages accruing from the process of chart-drafting?
7. Which of the organization chart forms do you prefer, and why?
8. The text explains nine outstanding organization defects. Which ones do you consider most important?
9. What are the disadvantages of the line type of organization?
10. Where did the organizational staff idea originate, and what purpose does it serve?
11. What is the simple distinction between the line and staff functions?
12. Under what circumstances is the staff occasionally asked to supervise?
13. When does the director of a general staff service perform distinct line functions?

14. To what extent, in your opinion, does the line-and-staff organization overcome the disadvantages of the line form?
15. How, and to what extent, has management made use of Taylor's discarded functional foremanship plan?
16. What is the difference between staff and functional services?
17. Why are management committees generally condemned?
18. Why is it possible for advisory committees to become ineffective?
19. Elaborate on the direct and indirect advantages of "multiple management."
20. What is the relation between manuals and standard practices?

CASE PROBLEM

Minter Supermarkets, Inc.

Lewis Minter started a small grocery store in Newberg, Ohio, a town of 3500 population, forty years ago with $500 he saved from his clerk's salary while working in his uncle's store. The move from clerk to proprietor was made shortly after his uncle's death.

The new business was moderately successful during the first year, providing Minter with a reasonable living. At the end of the second year, Minter had a $3000 inventory paid for and $875 in the bank. In ten years, he owned and operated four small neighborhood groceries. Fifteen years ago, in line with developments in the retail grocery business, he made a deal with the owner of a large lot, who agreed to build a store and adjoining warehouse at a cost not to exceed $25,000. The rental was fixed at 1 per cent of sales, with a guaranteed minimum monthly payment of $200.

At the end of five years, the new supermarket was doing a monthly business of $50,000 on an inventory valued at $20,000, which meant that the business was turning over its capital thirty times a year. The books showed gross earnings of 10 per cent of sales, about half of which was required for operating expenses. However, these earnings did not include any salary expense for the owner.

The success of the first supermarket led to the opening of three new markets in Newberg and six in neighboring cities within a radius of fifty miles. All the stores were served by five large trucks from a central warehouse located in Newberg.

Mr. Minter has decided to incorporate the ten supermarkets. The plan is to capitalize for $250,000 (all common stock), which about represents the value of his inventory and fixtures. Each of his two sons will be given $10,000 worth of stock in recognition of years of interested service, and each will be expected to buy $15,000 more, to be paid for from dividends.

Besides the usual merchandising problems, the Minter chain has three unions to deal with.

PROBLEM. Assuming that Lewis Minter will become chairman of the board in the new corporation, plan the rest of the organization, showing its functions and managing personnel, including the two sons. Which activities should be centralized and how will centralized control be maintained?

CHAPTER 9

Managerial Control

At any given period in the history of industrial growth from medieval times up to the present, the men who have been recognized as leaders of business and industry have tended to be those whose areas of personal competence best fitted them to exploit the resources and cope with the changing managerial techniques caused by the development of shifting productive forces. Thus, during the Middle Ages, it was the master craftsman who was recognized as the chief contributor to general business and the slowly rising standard of living.

The mercantilist traders of the Old World had their day from the sixteenth to the middle of the eighteenth centuries. Their chief claim to public esteem was the wealth which foreign trading brought to their native countries. Urged on by their governments, they imported gold and silver, chiefly from America, which supplemented services as a medium of exchange. By trading in foreign commerce and domestic production they became recognized as the economic builders of the state, a contribution which catered to a growing nationalism, already fostered by colonization.

With the rapid expansion in production and productivity that came with the Industrial Revolution, the scepter passed to the new chiefs of production, who based their supremacy not on any manual ability to turn out a product but on their ability to coordinate the activities of many men and machines in turning out products. The reign of the production chiefs lasted throughout the nineteenth century.[1]

When the rate of industrial expansion began to level off near the turn of the century, and industry began to take on its modern role of continuous mass production in an economy of potential abundance, new problems arose and those whose specialized skills equipped them to deal with these problems have been successively in demand for top-leadership positions.

After the general supply of producer and consumer goods caught up with, and then exceeded, demand, the salesman and advertising specialist ascended the throne of business. Distribution of the products became for a time a more pressing problem than the actual production of the goods. Successful salesmen received business' highest rewards.

---

[1] Taylor and his associates did much to enhance the importance of this phase of business management.

Then the income tax and numerous state and federal fiscal regulations brought the accountant to the fore. The significance of his services to profits often made him favored for promotion to top-executive positions, a reward formerly given to the enterprising sales manager.

With a feeble start in the First World War, a precipitous drop during the twenties and an equally fast resurgence during the late thirties, the human-relations phase of personnel work gained recognition in many quarters as the balance wheel of business. It was argued that productivity and costs in all lines depended primarily on happy workers, and keeping workers happy required the skills of the specialist in human relations. This phase of leadership was attested to by the sudden rise of human-relations literature, which is still being published in large volume.

Today, we are beginning to shift our managerial respect to the *controller*. He is being recognized as the person who sets the standards and the goals and sees that they are met through the appropriate procedures of coordination and control. It is his problem to keep in proper balance the multifarious facets of modern business and to see that they are harmoniously coordinated. This control phase of the leadership cycle is comparatively new, and not yet generally recognized, even by many of those holding control positions. Its pertinence will be more widely accepted as it is more widely understood, especially by those who, through the superiority of their controlling, demonstrate its virtues. There is no doubt that as production, sales, finance and many other functions of business tend to settle into narrowly flexible patterns, outstanding recognition will be given to the person who is able to exercise control over their individual operations and relationships.

What Is Control?

Because control is an increasingly important element in modern management, and because the word "control" will be a particularly crucial concept in many of the remaining chapters of this book, it will be well to explore its meaning rather thoroughly. The word is used in two different ways in the literature of modern management: first, to designate a general process, or function, of management; second, to refer to any specific instance of that process. On the more general level, we may define control as *the process of assuring that performance corresponds with plans.* For the more specific definition, we may turn to Webster's dictionary, where we are told that "a control" is "anything affording a standard of comparison or means of verification." It will be seen that both these definitions are really talking about the same thing, but on different levels of generality. The specific "standard of comparison" or "means of verification" mentioned in the second definition is the norm by which a performance can be said to correspond or not to correspond with plans. The second definition is important for us because it introduces this notion of a "standard," which, as we shall see, is the most significant of the tools of control that management has at its disposal.

Servo control

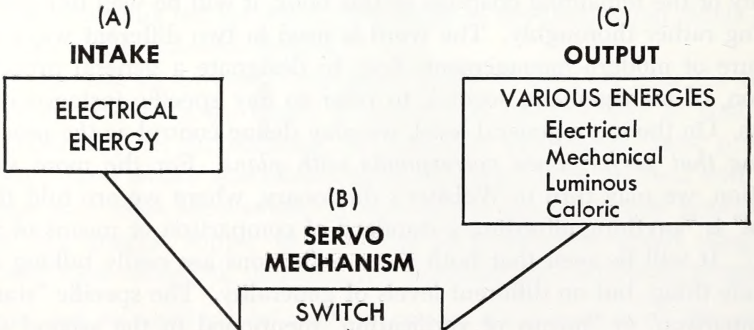
A good way to visualize the significance of the control process in management is to compare it with the servo mechanism of engineering. Control is a technical mechanism for governing action. This definition is as true in the management field as it is in the physical or mechanical, where it has been recognized for a long time. The engineer refers to control as "one of the most potent features of civilization." Managerial control makes its contribution to civilization by providing better products and services at lower costs. The control technique furnishes one of the outstanding points of contact between management and engineering, thus leading to such new titles as "management engineering" and "industrial engineering." The servo mechanism of engineering is essentially a mechanical control whose purposes may be effected by various types of energy. A simple illustration is given in Figure 9.1.

A small amount of mechanical energy can close the switch (B), thus controlling the transfer of the electrical energy intake (A) to affect the output (C) as electrical, mechanical, luminous or caloric energy. In this case, the type of energy (mechanical) used to operate the servo mechanism is not only different from either the intake or output energy, but power-wise it is weaker than either. From the standpoint of using the raw product to obtain the end product, the control is pivotal as to kind, quantity and quality.

In the same manner, the servo mechanism of management — control — attempts to bring about the desired relationship between intake and output in the business field. By the effective handling of (A) manpower, materials,

FIGURE 9.1

Servo Mechanism



tools and funds through its servo mechanism (B), which represents controls, it strives to improve the quality and reduce the price of the end product, whether it be goods or services. Some of the chief servo mechanisms of scientific management are utilization of personnel and facilities, fund distribution and fiscal control — these and many more working in an organizational setup which coordinates them.

The purpose of control

The purpose of control is to serve management so that it may be better able to make correct decisions and take considered action faster than it has done in the past, and on time. Time is of the essence for action based on controls. Since control has a distinctly scientific approach, it is a keener management tool than the methods which it replaces. Control is preceded by a collection of the facts bearing on a specific problem; these facts are passed on to management with recommendations based on their analysis and synthesis.

Controls are the guiding factors of business; they are the warning signals for management; they are one of the important bases for scientific management. Because they are all of these, they are an essential substitute for rule-of-thumb decisions. Properly planned and used, controls are the indicators or acceptable standards for production, finance, sales and numerous other activities. Over a period of time they mark out the path by which the present situation was reached in any activity subjected to their restraints. They supply experienced human judgment with an opportunity for charting the path ahead by indicating the means and methods for following that path.

Control as a cycle

Management has already been described as a cycle of planning, organizing, directing, coordinating and controlling. It is obvious that control would be impossible without attention to all four of the earlier phases in the cycle. But since any one of these four earlier phases in the general cycle of management raises a set of problems all its own, and since they are treated more fully in other places in the book, the discussion here will consider the process of control as itself a cycle; the other four general functions of management will be introduced only as they bear directly on the problem of control.

Seen as the process of assuring that performance corresponds with plans, control can be broken down into *four basic steps:* (1) setting standards, (2) checking on performance, (3) evaluating results and (4) taking corrective action. One of the chief ways that corrective action can be taken is in the formulation of new plans — or the setting of new standards — so that in this respect the fourth step of the process becomes the first step in a new cycle of the control process. This cycle can be diagrammed as in Figure 9.2.

Notice that setting new standards (1′) is not the only way of taking corrective action. The trouble may not lie in the standard but in the failure of a worker to comply with the standard, and in such a case the corrective

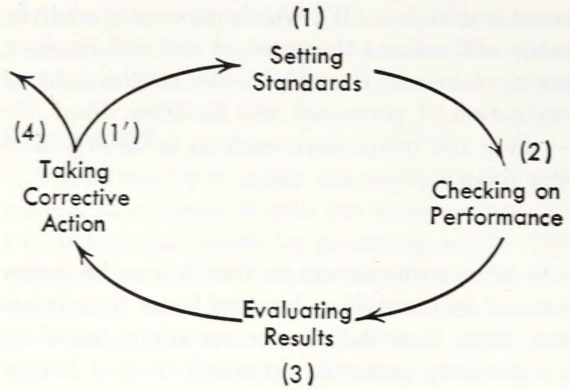


FIGURE 9.2

The Control Cycle

action would seek out a way to enforce the worker's compliance. Notice, incidentally, the similarity of this scheme to the more elaborate one shown further on in Figure 9.4.

In this cyclical process of control, the first step — the setting of standards — is important enough to warrant an extended discussion.

Setting Standards

Standards as tools of control

The chief tools of control can be listed as: methods, procedures, systems, statistics, records, reports and standards.

The first three of these tools were taken up in Chapter 2, as part of the discussion of systematic management. To recapitulate briefly, *methods* are standardized ways of performing any kind of operation — mental, manual or mechanical. Although methods, by definition, are standardized, they are not fixed for all time, but on the contrary they are constantly being improved as the search goes on for the "one best way" of doing a thing. A *procedure* is a standardized sequence of operations, specifying what methods will be used, who will use them, and when and where they will be used. A *system* is a network of procedures, combined in such a way that all the repetitive operations for any major activity of an enterprise can be specified beforehand. Procedures and systems are designed to relieve management of constant attention to recurring problems.

Statistics, which are often found in records and reports, are important aids to control in comparing past achievements with current conditions, and suggesting the future path to be followed with respect to the activity or procedure involved.

Reports are often compiled from *records*. Recorded items are summarized, with conclusions and recommendations for management's consideration, in the form of reports. This summary of the records in a single report saves much executive time. From the reports, and the records on which they are based, those responsible for control have a valuable source of information.

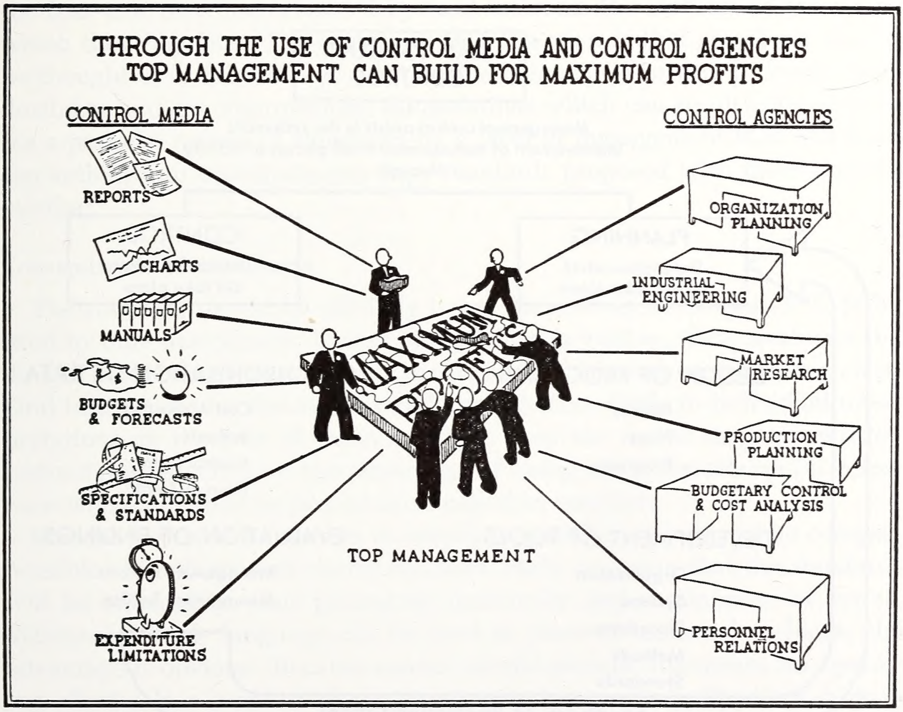
The *standard* is by far the most important tool of managerial control. A standard, or standard practice, may be defined as *a method, means or procedure to be used as a guide or model for carrying out a specific type of task.* Defined in this way, a standard is a set of instructions, or specifications, for the performance of a given task. It is by relating subsequent performance to the standard adopted that control is achieved. If the task is carried out according to the standard, it is said to be "under control." If it is not under control, responsibility is fixed so that the individual or section in charge of control can place the blame and advise the appropriate line officer on the corrective action necessary to bring the task back under control. Control media and agencies are illustrated in Figure 9.3.

The generality of standards

A standard, as it has been defined in the preceding paragraph, is a specific tool of management, arrived at by careful deliberation and then made

FIGURE 9.3

Control Tools and Agencies

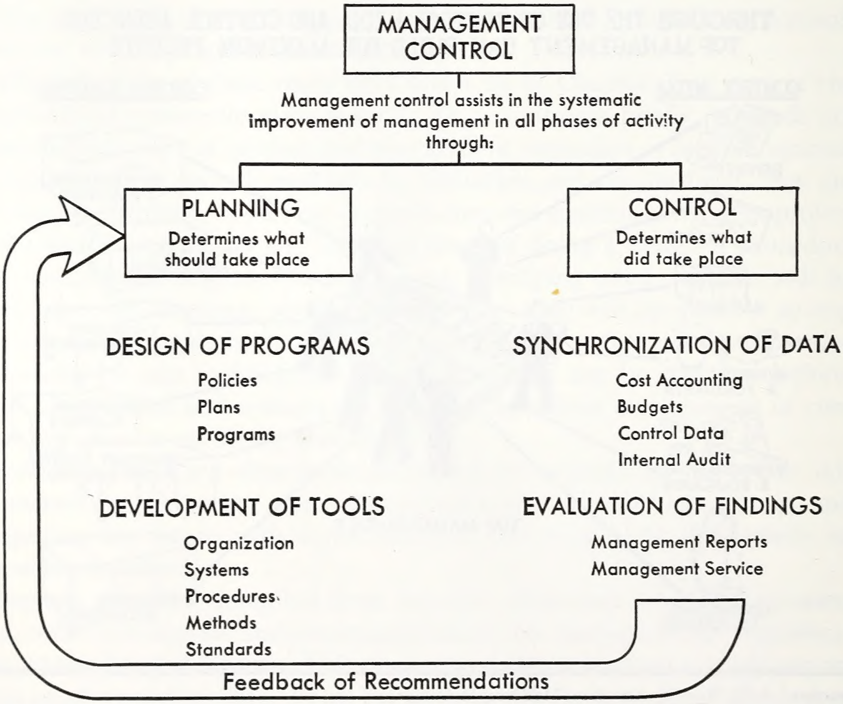

THROUGH THE USE OF CONTROL MEDIA AND CONTROL AGENCIES TOP MANAGEMENT CAN BUILD FOR MAXIMUM PROFITS
CONTROL MEDIA
REPORTS
CHARTS
MANUALS
BUDGETS & FORECASTS
SPECIFICATIONS & STANDARDS
EXPENDITURE LIMITATIONS
MAXIMUM PROFITS
TOP MANAGEMENT
CONTROL AGENCIES
ORGANIZATION PLANNING
INDUSTRIAL ENGINEERING
MARKET RESEARCH
PRODUCTION PLANNING
BUDGETARY CONTROL & COST ANALYSIS
PERSONNEL RELATIONS

Courtesy: A. E. Werolin, Associate, McKinsey & Company explicit, usually in writing, so that there will be no grounds for misinterpretation by the persons whose performance will be evaluated in terms of that standard. It is in this very specific sense that the word standard is used by many authorities on management. Thus, for example, in Figure 9.3 standards are listed as one of the "control media," along with specifications, manuals, charts, budgets, forecasts and so on. Again, in Figure 9.4, another authority lists standards as one of five "planning tools" in his scheme for management control. We have chosen to break down the control process into different categories from those used by these two authorities, but the general similarity among the three schemes will be apparent, and it will be seen that there is general agreement on the importance of the standard as a specific tool.

But in a very important respect, it could be maintained that standards lie behind all the other "tools" or "media" of control. For standards, or norms, are always implicit in any act of evaluation and control. Judgments are always made and corrective action is always taken in terms of some standard or norm, whether that standard is explicitly formulated or is only an inarticu-

FIGURE 9.4

Relation between Planning and Control


MANAGEMENT CONTROL
Management control assists in the systematic improvement of management in all phases of activity through:
PLANNING
Determines what should take place
CONTROL
Determines what did take place
DESIGN OF PROGRAMS
Policies
Plans
Programs
SYNCHRONIZATION OF DATA
Cost Accounting
Budgets
Control Data
Internal Audit
DEVELOPMENT OF TOOLS
Organization
Systems
Procedures
Methods
Standards
EVALUATION OF FINDINGS
Management Reports
Management Service
Feedback of Recommendations

Copyright 1949 by Alex W. Rathe and reprinted with permission of Mr. Rathe late notion, in the mind of the judge, that "this is or is not the way things ought to be done."

It is in this more general sense of the word that we can say that standards lie behind the other tools of control. Thus, statistics and records are seen to be valuable because they supply the data on which standards are based. And, viewed from this perspective, methods *are* standards and procedures and systems are sets of standards. Although in the following discussion we shall be talking about standards in the more restricted sense of explicit instructions for specified operations, the fact that standards are implicit in all mechanisms of control should constantly be borne in mind.

Development of standards

A standard suggests the "one best way" for handling a procedure or operation. It applies generally to a situation, operation or problem of some complexity and is set up after careful thought and analysis. Once the standard has been worked out and adopted it can be applied as a routine way of dealing with the type of situation it covers.

Flexibility. No standard is ever perfect. It may be the one best way known at the time of its adoption, but subsequent knowledge or experimentation may devise a better way, and this should replace the existing standard. A reasonable objection to the emphasis on standards is rooted in the fear that their importance may tend to freeze the method or procedure which they regulate. The answer to this objection is that standards should be thought of as flexible and not a final settlement. The way to insure their flexibility and the improvement in operations which can result is to provide for a periodic review of standards by a level of management that will have the authority to coordinate any new standards proposed with those already existing.

Transmission of standards

The standard should be officially issued, in *writing*, even when it is to be used by only one person. Unless the standard is written, there is always the danger of its being lost to the process because of labor or executive turnover. Oral instructions for the use of standards are more liable to individual interpretations on the part of those to whom they are issued than are written instructions, which have the advantage of being always available for reference when a method or procedure is called in question.

Standards should be written as *simply* as possible and always be comprehensible. Simplicity and clarity are more likely to insure that the standards will be adhered to, thus promoting uniformity and a minimum of errors. Whenever simple language can be used in place of technical verbiage, the advantage is obvious. Because control should provide the means for operating effectively a number of scattered, complex business situations from a central headquarters, the standards on which such control is based should be so drawn up that they are not subject to misinterpretation by the employees concerned, even when they are located in branches far removed from each other.

The importance of standards

Standards which are scientifically developed and rigidly enforced aid both management and employees in several ways. Standards save *time.* From the employee's point of view, the existence of a standard to cover a particular problem situation does away with the delay that would otherwise result while a solution to the problem was being worked out. Standards save an executive's time by freeing his attention from repetitive operations.

Without standards, individuals handling the same problem at various times and in various departments might well reach different decisions about its solution. Thus standards are an invaluable aid to management in *coordinating* activities widely scattered in time and space. Finally, they offer a ready-made opportunity for fixing responsibility for errors, exercising controls and applying corrective action.

To give an idea of the variety of types of standard, the following list presents examples of standards used in each of several different business and industrial activities:

Activity	*Examples of Standard*
Financial management	Fiscal ratios
Budgetary control	Records of past experience
Maintenance	Standard times
Production control	Scheduling
Inspection	Specifications
Inventory control	Ordering quantities
Job evaluation	Training times
Service rating	Absences
Procurement	Production cycles

Conclusions

Controls are just as good as the standards on which they are based. They are practically worthless unless the standards are used. Important criteria of standards are simplicity, comprehensiveness, flexibility and attainability. A standard can be set so high that it becomes valueless for practical purposes. When carried too far, this fault can have serious effects on worker or executive morale. Just as controls are necessary for weighing accomplishments against goals and for taking corrective action when the accomplishments are out of control, so standards are necessary as bases for the comparisons and for suggesting the kind and degree of corrective action. In many cases the setting of workable standards is more difficult than actually using them as tools of control.

The establishment of standards for intangible achievements is more difficult than for tangible accomplishments. For example, production standards may be developed by time study, a relatively scientific procedure. Morale standards, on the other hand, must necessarily be based on more subjective criteria. The same is true of worker-training programs and the standards for gauging the effectiveness of communications. Likewise, it is easier to control line activities than staff ones, most of which have highly intangible elements.

Besides acting as a check between desired results and actual performance, standards aid in communicating pertinent information, in assisting with overall coordination and in contributing to decision-making. These aids can indeed be important potentials in advancing the cause of good management and profits.

Who Does the Controlling?

A problem that recurs in the scientific study of management is the fact that, whereas functions tend to remain constant, organizational responsibility for the performance of those functions varies with the size and complexity of the organization under consideration. And so to the question, "Who does the controlling?" there is no simple answer. The control process will go through pretty much the same kind of four-step cycle whatever the size of the organization; but the setting in motion of a program for control — which means the allocation of responsibility for it within an organizational structure — becomes a more complicated problem as the concern in question grows and subdivides itself into separate functional units.

One structural generalization may be advanced: that aspect of control which Webster defines as the exercise of "directing, guiding or restraining power" is a *line* function; the preparation of data, analyses and recommendations for controlling is a *staff* activity. This way of breaking down the problem brings us a step nearer to the allocation of responsibility — but only one step nearer. That the situation is still beset with complexities will be seen when we realize that both line and staff activities are involved in each of the four steps in the control cycle — setting standards, checking on performance, evaluating results, and taking corrective action.

Small versus large concerns

In the small concern, line and staff activities tend to be performed by a single person. One-man management can exercise effective control without the elaborate fact-finding and analysis that are required in large and complex organizations. In fact, the small business enjoys a competitive advantage in matters of control because of the boss's intimate knowledge of his workers, materials, finances and customers. His decisions can be relatively simple and they are often repetitive. He can exercise his control more promptly, but it should not be supposed for this reason that his decisions are merely snap judgments in the ordinary sense of the word. His directing and restraining actions are often made in terms of standards that are based on long experience and dependable facts. He can piece together the few factors necessary for effective and speedy control because these factors are relatively simple and accurately recognized from constant contact and long familiarity with them.

As businesses increase in size and their activities, products or services become more complex, a high degree of technical planning becomes necessary for the establishment of adequate controls. Line and staff responsibilities can no longer be combined in the same personnel. Widely scattered business units or industrial plants further complicate the planning and exercise of controls. The control problem often becomes one of management's chief concerns in giant industries whose operating units are scattered all over this country and even in foreign lands.

A list of the most important functions and activities now subjected to planned controls in large concerns will give an idea of the importance of the control aspect of modern management:

Planning
Organization
Policies
Research
Forecasting
Standards
Quality
Methods
Procedures
Manuals
Reports
Forms
Finance
Accounting
Budgeting
Costing
Manpower
Wage & salary
Incentives
Distribution
Purchasing
Production
Machines
Layout
Materials
Maintenance

Other subjects for management control are being developed constantly. The authors of *Internal Auditing for Management* suggest work simplification and measurement and market research as relatively recent additions to the list of items subjected to control techniques. They maintain that such controls "must be adopted by large companies if the management of an enterprise wishes to establish real coordination and control over the operations for which it is responsible." [2]

Preliminary considerations

Before turning directly to the problem of allocation of responsibility for control in the large concern, there are a few general considerations to be mentioned briefly.

Essentials for Control. In order to draw up a program for control that will be comprehensive, attention to the following items is essential:

1. Definite objectives
2. Suitable organization

---

[2] Lamperti and Thurston (New York: Prentice-Hall, 1953), p. 95.

3. Prepared programs
4. Established policies
5. Adequate procedures
6. Budgeted funds
7. Trained personnel
8. Properly placed personnel
9. Progress inspections
10. Measuring standards
11. Regular and special reports

Too Much or Too Little. The typical executive is interested in controlling a wide variety of operations, procedures, plans, departments, persons and things. The "inspired" manager usually feels that he is capable of muddling through. At the other extreme is the manager who is oversold on scientific controls. He may have his control staff of one or more persons working on such a variety of subjects and problems that their efforts are dissipated and their results questionable, to say the least. It may well happen that the costs of a far-flung control program exceed its value, even when the program is nominally successful.

The Importance of Communication. Through the dissemination of information contained in control media, management aids the important function of communication, both up and down the line and across it. Reports based on dependable records, manuals of various kinds, budgets, specifications and standards all contribute to the effectiveness of managerial action. Part of this effectiveness is due to the comparative care with which control media are compiled. Another part is due to the nature of the media which generally cross activity lines. In seeking information from that part of a standard or a report which directly concerns his agency, the subexecutive often obtains useful information unexpectedly from other parts of the document. To the extent that this is true, he unconsciously equips himself to improve the coordination of his activity with others, thus benefiting the organization as a whole.

The communication of accurate information of any kind is one of the problems of management. The value of correct information is often determined by the success it has in reaching everyone who is directly or indirectly concerned. Good communication is more difficult to achieve than the average person suspects; but, once achieved, its value is inestimable in bringing about the spirit of cooperation that flows from the sense of belonging which is a natural by-product of a detailed knowledge of the company's affairs.

Controls for Research. One of the difficult but important phases of managerial control is in the field of research. Here the intangibles appear in their purest form. The difficulty arises in both pure and applied research, but particularly with the former. Applied research usually has a definite objective, but how much time will be required for its accomplishment, and how much it will cost are highly variable factors. Pure research is almost beyond the realm of control, except for the power to have it stopped when the reports on which decisions must be based indicate that impassable hurdles have been reached.

In the field of applied research, control is generally expressed in terms of time and costs. Periodic progress reports advise the control agency or individual about the likelihood of meeting these standards. Progress already made determines whether the allowed time and costs shall be extended. Unless there is a reasonable backlog of experience with similar applied research projects, the controls exercised must be based largely on management opinions, supported by those of the scientists doing the work.

With these general considerations out of the way, we can return now to the problem of who does the controlling.

The exception principle of control

The over-all responsibility for control rests with top management and, in the final analysis, with the chief executive of a concern. But the top manager simply does not have the time, in a concern of any complexity, to attend to every aspect of the control program. We have already spoken of the "inspired" manager — the one who likes to have his finger in every pie. "He feels," wrote Taylor some fifty years ago of this type of manager, "that by having this mass of detail pass over his desk he is keeping in close touch with the entire business. The exception principle is directly the reverse of this. Under it the manager should receive only condensed, summarized and *invariably* comparative reports, covering, however, all of the elements entering into the management, and even these summaries should all be carefully gone over by an assistant before they reach the manager, and have all the exceptions to the past averages or to the standards pointed out, both the especially good and the especially bad exceptions, thus giving him in a few minutes a full view of progress which is being made, or the reverse, and leaving him free to consider the broader lines of policy and to study the character and fitness of the important men under him." [3]

This is the exception principle of control, Taylor's first outstanding contribution to industrial engineering. It has already been discussed as one of the basic principles of organization in Chapter 7. The virtue of the exception principle is that it allows the executive to center his attention on the activities that are out of control. By operating within an organizational structure that isolates the exceptional matters for his attention, the manager can devote more time to the problems and do a better job of correcting them. The success of the exception principle in practice will depend largely on how well the closely related principle of delegation of authority is carried out in action: if the manager is going to restrict his attention to the exceptional, then there must be somebody else to attend to the routine.

---

[3] *Shop Management*, pp. 126–127. Reprinted in F. W. Taylor, *Scientific Management* (New York: Harper & Brothers, 1947).

Delegation. This has already been discussed in Chapter 7 as another of the fundamental principles of organization. Delegation is the technique of getting the job done by the assignment of tasks to others. If all the assigned tasks are based on adequate instructions and followed through to successful completion by the delegatees, their coordinated efforts will lead to success. But this represents the ideal. It is more usual for some of the groups to misunderstand instructions unless they are written, and even then some orders are subject to misinterpretation unless they are concise and clear. As the chief tool of control, the standard not only measures the success or failure of the assigned task, but the degree to which it hits or misses the mark. Control can find out why, and authority can proceed to apply correctives, with disciplinary action if advisable.

If it were not for the possibilities of stabilized management through controls, results of delegation would be more precarious. Managerial controls make it possible to extend delegation and thus permit the executive to accomplish more tasks with reasonable confidence that they are being done well.

The level below top management

The preparation of control procedures is often a difficult task which requires the efforts of someone skilled in their use, assisted by the person in charge of the function to be controlled. Controls of this type are usually exercised on a departmental level, to check the various activities for which the department is responsible. This control level receives its authority from the functional definition which prescribes its duties. Its right to take remedial action for activities out of control is inherent in the assignment of its positional authority. Remedial action on the departmental level occasionally requires the assistance of top mangement. If departmental productivity is falling off, for example, an appeal to some higher executive may request that procurement be instructed to supply a more steady flow of raw materials.

Some member of management, possibly the executive vice-president, may exercise over-all controls on the basis of periodic reports received from the departments. One plan for this coordinating control consists of a single sheet with spaces for a large number of statistical summaries, such as volume of production and number of employees on a departmental basis. Financial figures, including cash balances, accounts receivable and payable, volume of sales and many others, are also recorded. All statistics show figures for one or two previous periods, for comparative purposes.

A control report of this kind may contain a hundred blocks on a single sheet of six square feet. The top executive of one company receives a daily master control made up along these lines. An assistant to the treasurer prepares the control sheet after the close of business, so that it is on the chief's desk when he arrives in the morning. Familiarity with the system makes it possible to scan the entire report in an hour. After items which appear to be out of control are blue-penciled, the secretary makes arrangements with the heads of departments responsible for the exceptional cases (those not under control) to report for ten-minute conferences with the vice-president. With this plan, one top executive can keep in daily contact with company affairs and provide summaries for periodic staff meetings. At these biweekly meetings, all staff members can be advised of weak spots in the organization.

When the concern is so large that it is practically impossible for one person to collect and analyze the information necessary for adequate controls, the work must be done by a group of specialists. For this purpose, the central control section has evolved within recent years.

The central control section

The purpose of this section is to gather all control activities into one unit. Today many military establishments point with pride to their central control rooms with their statistical analyses, charts and pictorial histories. The same is true of large insurance companies, large industries, department stores and airlines. The idea has not proved useful for small businesses, but it has been found to be a distinct advantage for concerns with a large number of employees, scattered plants and complex operations.

By merging all control activities into a single unit, the centralized control section can bring these activities into sharper focus; it can improve the balance and coordination between staff and line functions, thereby minimizing unhealthy rivalries and duplication of effort and, at the same time, effecting operating economies. Centralized control provides for the smooth flow of pertinent information from its source through to the point where it becomes the basis for managerial corrective action. There is no standard pattern for the central control section; it must be fitted to the needs of individual concerns. However, since there are fundamental principles for guiding centralized control activities, the structural variation is within limits.

Testing the Need for Central Control. If a large organization with diversified operations scattered over wide areas is considering the establishment of a central control section, the decision will be aided by surveying the existing control units, the number of personnel employed in them, their cost and their effectiveness. Effectiveness can be measured in part by the number of statistical studies and reports that are being duplicated under the present system; by the kinds and nature of the manuals now in use; by the accuracy, dependability, quality and timeliness of the current organization charts; by existing methods for introducing and controlling new procedures; and by the procedure for compiling and controlling the budget.

Purpose of Central Control. The purpose of central control is to find out the facts and recommend action to management. Its activities are those of an advisory staff, with no line powers of action. It aids management by analyzing its findings and suggesting remedies where faults are discovered.

It aids communications — when executive members of the line so order — by issuing directives in management's name. Planning, forecasting, methods-engineering and internal audits may all be considered phases of the central control section's duties.

Organizational Structure. It is generally agreed that the director of the central control section should have the rank of vice-president and report directly to the chief executive. Responsibility within the section can be allocated with respect to five general functions: (1) organization and management (2) policies and planning (3) systems and procedures (4) reports and analyses and (5) research control. Of course, the number of personnel and the breakdown of activities under these general functions will depend on the nature and size of the business. This simple structure is shown in Figure 9.5.

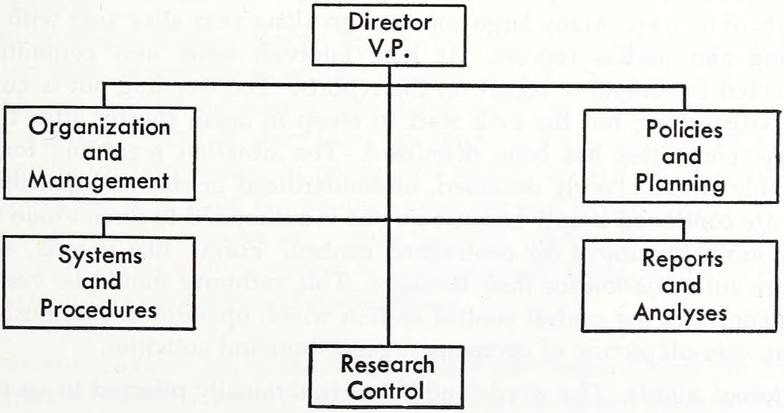
The Chart Room. Statistical analyses are usually found in a special room, customarily referred to as the "control room" or "chart room." Here the walls are covered with charts analyzing all kinds of operations, procedures and financial data. Based upon both current and historical information, the charts indicate trends, which are an important guide for policy-making. These rooms are equipped with chairs, or even desks, where top management and directors meet to discuss future plans and policies.

Duties of central control

The chief executive has the ultimate responsibility for control. There are some control duties that he can and must attend to personally; for others he must have the assistance of staff specialists. This latter group of duties includes: (1) programs and plans — without which the executive's personal duties could not be performed effectively; (2) the coordination of de-

FIGURE 9.5

Central Control Organization



partmental activities; (3) appraisal of individual and departmental performance, or "internal auditing"; and (4) the formulation of measures for correcting unsatisfactory performances. Let us discuss each of these four functions of the central control section in more detail.

Programs and Plans. Central control reviews the programs and plans of the various departments for the purpose of suggesting improvements and integrating their activities with the basic policies of the company. The studies on which these recommendations are based are of inestimable value to management, both as reliable information and background for analyses.

The central control section prepares operating and expense programs for such functional divisions as finance, research, sales, advertising and procurement. Its plans and programs should be based on the best available practices and standards, tempered by the concern's statistical data and the section's own judgment. Programs may be set up for short-term objectives, or they may include plans extending over a number of years.

Coordination. The task of coordination demands an over-all perspective not easily attained by the individual departments for which central control is making its recommendations. The groundwork for coordination is to be found in manuals prepared for the various levels of management. When the manuals are prepared by the level of management which they are intended to serve, they may sometimes be poorly planned and poorly written, they may lack clarity of expression and comprehensiveness and, most serious of all, they are likely to lack coordination with manuals being used on other levels of management and with general, basic policies. Mediocre manuals can hamper integration of the organizational structure.

Recommending operating changes to the various levels through study of their manuals, improving the content and expository style of manuals and keeping them revised to correspond with changes in over-all policy and procedure are duties which can best be performed by a central control section.

The improvement and coordination of reports and reporting are unwanted tasks that will never be performed properly by a line agency which compiles reports of its own. Many large concerns go along year after year with overlapping and useless reports. At long intervals some new committee is instructed to compile a report on the reports. The weeding out is customarily satisfactory, but the evils start to creep in again shortly after the reporting committee has been dismissed. The situation regarding forms is probably worse. Poorly designed, unstandardized in size and distribution, they are continued simply because no one is authorized to discontinue them. They are a fit subject for centralized control. Forms, like reports, should require authorization for their issuance. This authority should be vested in an agency like the central control section which operates continuously and has an over-all picture of company organization and activities.

Internal Audits. The word "audit" has traditionally referred to an operation primarily, if not exclusively, fiscal in nature and performed by the financial department. The purpose of this kind of audit is to prepare financial reports for the guidance of top management; such audits are primarily statistical compilations about operations, expressed in terms of dollars.

The *managerial internal audit* under discussion here, however, is a relatively new phenomenon. It is an analysis of company activities based on accepted standards or norms. This kind of audit has been made periodically for a number of years by outside management-consulting firms. The lapses between these outside managerial audits have sometimes extended over a number of years. The internal audits of the central control section, on the other hand, are going on continually. Besides this advantage of survey continuity, the control section has an ever expanding knowledge of company conditions, practices and personnel.

Information accruing from the internal audit is of prime importance to the chief executive and his immediate line subordinates. In the first place, the factual basis of the audit is presumably correct, objective and professional. Furthermore, because the internal auditing personnel remain with the company, the care which they exercise in making their surveys and preparing their reports, analyses and recommendations tends to be maximized.

Top management would find it very difficult indeed to make its own audit of the levels of management beneath it. Subexecutives and foremen are most unlikely to stage an ordinary performance for the observation of top management, whose comings and goings have an uncanny way of being communicated through the shop. Not so of the central control personnel, who are always on the job — and without any line authority. No red carpet is rolled out at their unheralded approach. Their part in the control process is less visible and less keenly felt until it is reflected in the corrective action based on their reports. The central control personnel have a sort of protective coloring that enables them to move about inconspicuously as they make their surveys of both line and staff operations. This protective coloring, along with their training and experience in being objective, puts them in an ideal position for detecting "parade formations" and defects in operating reports.

It is customary for the control section to include the survey information, together with an analysis of general business and economic conditions, in a monthly report; such a report assists management in its decisions, and aids the board of directors in short-term planning. Schooled in the art of presenting control information in charts and tables, as well as in words, the control section can make the findings more accessible and useful for busy policy-determiners. Besides the regular periodic reports, it is common practice for the central control section to prepare many kinds of special reports at the request of directors and management.

Corrective Action. Line officers have the sole responsibility for taking corrective action when reports of the central control agency indicate unsatisfactory findings. However, here too the line has learned to look for advice from the control section, which has been almost as close to the staff and operating personnel as their own managers. An important point about corrective action under centralized control is that the section may often correct troublesome conditions by making direct suggestions to the departments concerned. Assuming that the section's suggestions are reasonable, it is easy to understand why they would be followed in most cases, rather than be allowed to appear in a report to top management.

Actually, a prominent service of the central control section should be giving aid and advice to all departments and their subordinate units. Although this phase of control is not so directly visible to management as are faults brought out in the survey reports, any improvement in the smooth operation of the concern is likely to be observed by top management. This positive approach to trouble-shooting is always preferable to the negative reporting method.

Conclusions

Because of the constantly increasing tempo of competition in most lines of business, it seems reasonable to conclude that the control factor of business will become correspondingly important as its techniques are refined. It is also apparent that as the territorial spread is expanded and operating complexity intensified, large business enterprises will depend more and more on centralized sections for the solutions to their control problems.

Planning and control are closely related. Planning determines what should take place; controlling compares it with what actually happened. If these two — planning and performance — are not in harmony, then the performance is said to be out of control, and something must be done about it. Follow-up with corrective action is essential if control is to be worth while. Checking actual results with plans is a necessary preliminary to enforcing compliance.

Control is facilitated when everyone concerned is conversant with the desired objectives. This suggests that communication cannot be left to chance. In some cases it is unfair to allocate responsibility for control unless positive plans are provided for the communication of objectives and other pertinent data to all those who are participating in the task.

It has been found in practice that, when control techniques are carried too far or too fast, they may leave an irrevocably bad impression before any positive results appear. When faith in the control principle has been undermined in this way, it may be that even a rational substitute will not be acceptable. Controls should first be applied to those outstanding phases of operations which are important enough to attract general attention. Besides being damaging to the progress and acceptance of the control idea, *over*-control is likely to cost more than it is worth.

Managerial control, adequately planned and rationally practiced, will provide any business with improved operating efficiency and more productive results. A good control program should not only establish standards and enforce them, but it should be constantly alert for improvements in them. It should specify organizational responsibilities and then check them in action. It should furnish basic information for the formulation and revision of important policies, procedures and directives. Checking, evaluating and improving are of the very essence of good control.

Finally, centralized control represents the keystone of coordinated controls for those situations where it is applicable. Unless the company or agency using centralized control has several thousand employees, scattered over wide territories, with complex operations, this highly refined tool of management may turn out to be a millstone. However, the future of this centralized control for large-scale operations will probably represent one of the fascinating evolutions of modern management.

QUESTIONS

1. What are some of the reasons for business leadership passing to the controller?
2. Explain the line and staff phases of control.
3. Why do small concerns have a competitive advantage in the matter of control? What are some of the advantages?
4. Name three factors of a business that make scientifically planned controls advisable.
5. How can the technical mechanism of servo control be applied to the field of management?
6. What are some of the prerequisites for establishing sound controls?
7. In what important ways can the control technique serve management?
8. To what management activities can controls be applied?
9. What are the four basic steps in the control process?
10. What are the six chief tools of control, and which one is most important?
11. How would you define a standard?
12. What is the relation between a standard and the "one best way"? To what extent does the latter freeze the former?
13. Give examples of standards used in several different activities.
14. To what extent are controls influenced by standards?
15. Are standards more difficult to establish for tangible or intangible activities, and why? Give examples.
16. What is meant by the exception principle of control?
17. What is the relation between control and delegation? between control and communication? between control and research?
18. Under what circumstances is it advisable to establish a central control section?
19. What are the four outstanding duties of the central control section?
20. What do you consider the chief significance of the internal managerial audit?

CASE PROBLEM

DIXON DISTRIBUTORS, INC.

Dixon Distributors, Inc., was started about twenty-five years ago in Michigan and has always maintained its headquarters in Detroit. Its management has been progressive, resulting in average sales of about $25,000,000 for the past three years. It has five warehouses in the eastern and southern part of the country and one in Toronto. Sales offices are located in each of these six warehouses. All branch sales offices are under a local manager, who also has charge of the warehouse, which is relatively simple as a bookkeeping operation. The branch sales managers are controlled from Detroit, their manuals leaving them little opportunity for initiative.

Merchandise distributed by the Dixon firm is obtained in various ways. Some of it is bought outright from manufacturers; for most of the merchandise, the company has exclusive territorial franchises from producers; and it has bought controlling interests in three small industries. Finally, the Detroit headquarters is located in an industrial building, where the company assembles some of its items.

Accounting, purchasing and sales are all centered in the home office. From an organizational standpoint, the business is highly centralized. The company is a closed corporation in which two majority stockholders serve as president and treasurer, with a tight supervision and control.

During the past two years, the two men who control the business have begun to feel the pressure which has resulted from rapid expansion. They are further conscious of the fact that some of their real control is being lost in the increasing volume of detail with which they must keep abreast. They have been considering the advisability of drawing the purchasing agent, sales manager and chief accountant closer to top management. In the past, these three have been receiving instructions from their two chiefs, who have never set up a clear division of responsibilities between themselves.

It has been decided to have an internal managerial audit for the purpose of getting a clearer picture of operations from the standpoint of managerial efficiency and to work out plans for a reorganization.

PROBLEM. Should the Dixon concern call in an outside consultant or should they do the auditing job themselves? Or should they follow some combination plan? How can this initial job be made the basis for a more or less continuous internal audit of the company's affairs?

CHAPTER 10

Financial Management

Determining financial plans and policies, and controlling them in practice, are vital to the progress, and often the existence, of any enterprise. Planning and controlling are parts of the same procedure, and both are necessary for success. These twins of finance cover determination of policies, or administration, and the execution of policies, or management. When the associated concept of company ownership is added to the management of its finances, this chapter might well be entitled: Finance, Ownership, Management.

Financing is *the process of raising and using various kinds of funds for establishing and operating an enterprise.* It is one of the fundamental activities of modern management. The outstanding cause of failure among business concerns, especially the smaller ones, is the general lack of training and experience of their leaders in the general techniques of management, and especially of financial management. The Dun & Bradstreet credit agency emphasizes this point in a recent report.[1]

Many failures could be avoided if financial requirements were well planned in advance. Starting a business with inadequate assets is courting disaster. Too much money, on the other hand, may lead to poor investment of surplus funds. Furthermore, the company's credit and the market value of its common stock are both depressed when earnings do not bear a reasonable relation to its total assets. The average earnings of successful concerns amount to approximately 10 per cent of their sales. The relation between assets and volume of earnings depends on the turnover of assets as related to sales volume. It is practically impossible to decide whether under- or over-capitalization is worse because of the many factors involved and their application to varying conditions.

Operating a company with insufficient funds during its early stages, on the assumption that additional financing can be taken care of as the need arises, is often fatal. Even when investment capital is seeking opportunities, it may have a suspicious nature. It wants to know all the facts, and if interested it starts to bargain. Any concern in "urgent need" of funds, be it newly organized or with some maturity, is suspect. There is always the fair assumption that it does not know how it stands, or where it is headed, simply because its management has no financial plan. The lack of a plan may be due to the absence of data and records useful for control purposes. The failure to control invariably springs from the lack of established standards. A company in this predicament is a poor credit risk, a condition which prevents normal dealings with the recognized sources of funds.

---

[1] Roy A. Foulke, *Behind the Scenes of Business* (Rev. ed.; New York: Dun & Bradstreet, 1952), p. 54. For a summary of the underlying causes of business failures as compiled by the U. S. Department of Commerce, see Louis P. Starkweather, Erich A. Otto and H. Randall Kreger, *Policies and Practices in Corporate Finance* (New York: New York University Bookstore, 1951), pp. 261–264.

Lack of adequate data for financial planning invariably leads to panicky negotiating by the prospective borrower, who soon convinces the lender that he does not know what he is talking about. Without a convincing financial plan, the borrower cannot justify the amount of his desired loan, explain exactly what it will be used for, or state how much he can afford to pay for it and when he can repay it.

After the concern is established, and operating with a reasonable amount of funds at its disposal, problems involving financing are continually presenting themselves for solution and decision. Business is essentially dynamic if it is successful. It is either expanding because of increased demands for its products, or contracting because of a general decline in economic conditions or a lessened customer demand. In either case, financial adjustments are required. The further ahead market analysis can foresee these changes, the more effective is the financial planning to cope with them.

The chief financial problem of management is to maintain a constant flow of funds into circulating assets such as raw materials, work-in-process and finished products. These working assets represent the blood stream of business. Cash must be used to buy raw materials which are converted into inventories to be sold to customers. Inventories must be turned into receivables due from customers to whom the products have been sold. When customer receivables have been collected they are converted into cash, ready to make a new start in the process or flow over which financial management must exercise a controlling hand. The excess of collected receivables over the total cost of products is profit.

Financial management must supply the correct amount of funds at reasonable cost, and at the right time, to maintain this flow of cash to cash. Excess of inventories or frozen receivables will slow the circulating process of current assets, and reduce profits. If the circulating process is impeded over a long period of time, the entire organism may be stifled and the business fail.

Assets, Liabilities and Working Capital

The assets, or resources, of a company are of two general kinds — fixed and current. Liabilities are likewise divided into fixed, or long-term, and current.

Current assets, or circulating capital, are also referred to as "quick" or "liquid." They include cash and marketable securities, accounts and notes receivable, inventories, and any advances made by customers. They are called "liquid" because they can be converted into cash with reasonable dispatch, and "circulating" because they move through the various stages of production and receivables, and back to cash.

Current or circulating assets must be large enough and sufficiently liquid to meet currently maturing liabilities, including such items as payroll, materials, interest and dividends. Sometimes a portion of current assets may be used to buy fixed assets, such as machinery and equipment, which are slow in circulating, if indeed they may be considered to "circulate" at all. When an excess of such conversions occurs, serious financial difficulties may result. Conversion may also operate in the opposite direction, when reserves that are set aside for depreciation of fixed assets are used for current operations. In this way, cash can emerge from fixed assets, and become a part of current funds.

Fixed assets are permanent in nature, and not easily converted into cash except at considerable loss. They include land, buildings, machinery, equipment, furniture and fixtures, and good will when this item appears on the financial statement. Investment in subsidiaries is another form of fixed assets.

Current liabilities represent company debts which will be payable within a relatively short time, in no case longer than a year. They cover accounts and notes payable to trade customers and others. In some cases, bonds payable within the year are classed as current liabilities. They also include accrued expenses such as taxes, interest and salaries. Declared dividends are current liabilities until paid. Finally, this category includes reserves set up to meet various future obligations payable within the year, such as income taxes.

Long-term, or *fixed liabilities* include bonds, notes of longer than a year's maturity, and mortgages.

Working capital

Working capital, which is defined as the excess of current assets over current liabilities, is the prime fund for financing the circulation of raw materials to finished products and back again to cash.[2] When a concern's liabilities exceed its assets, it is insolvent, which means that it cannot pay all of its creditors. Whether the creditors allow it to continue operations, in the hope that the situation will improve, is often a question of business judgment.

Long-term funds are naturally required to finance fixed assets. Because they are invested in such items as buildings and machinery, it is relatively easy to determine the financial requirements for fixed assets. On the other hand, figuring the needs for current assets and working capital involves a number of elastic factors.

---

[2] Some writers in the field of finance use the term "working capital" to cover both fixed and current assets, on the theory that the plant and equipment are also part of the concern's working tools. In such cases the term "net working capital" is applied to the difference between this figure and current liabilities. See Starkweather, Otto and Kreger, *op. cit.,* p. 138.

1. The *cost of material, labor and overhead* naturally influences the amount of circulating funds needed to finance a given volume of production for a manufacturer, or sales for a merchandising concern. Producing for the high-quality market demands relatively expensive materials and high-priced labor.

2. The *volume of production* (or volume of sales in merchandising companies) is another important consideration influencing working capital requirements. Stepped-up production increases the need for cash by a fairly proportionate amount for all costs except overhead. It means, among other things, larger inventories and more accounts and notes receivable.

3. The *length-of-production cycle* refers to the time it takes to transform raw materials into the finished product. The number of components, especially if they are made rather than bought, may influence the production cycle. Longer periods are often required when the production process requires curing of some kind, as in the production of liquors, tobacco and hides. When material and labor costs must be financed during prolonged production cycles, the working-capital needs are increased.

4. The *ratio of sales to investment* determines the turnover of the funds used in the business. Such concerns as public utilities have large capital investments compared to their volume of business. Therefore their turnover is low. Some companies may turn over their capital ten times a year. Retail concerns should have a higher turnover. Chain grocery companies may turn over from thirty to fifty times a year. Obviously a high turnover minimizes the required capital investment. When the ratio of sales to investment is high, the working-capital funds required to operate the business are correspondingly low.

5. When the *credit terms granted by vendors,* or suppliers, are extended, the amount of working capital requirements is reduced. In other words, vendors are contributing to working capital in proportion to the length of credit terms they allow buyers. If the production cycle is also of long duration, working capital requirements may be high in spite of favorable vendor credits. However, total requirements are affected favorably by vendor credit extensions.

6. The extension of *credit terms granted to customers* has the reverse effect on the amount of working capital requirements. Chain groceries selling for cash may operate with comparatively small working capital, particularly if they can secure long-term credits from vendors. It is this condition, together with rapid turnover, which permits businesses of this type to sell on small profit margins.

Assets may be obtained for short, intermediate and long-term purposes. The *short-term* source is usually a commercial bank, on notes running thirty to ninety days. With renewals, the notes may be extended for as long as a year. These funds are used to pay for materials, labor and other items that lead to quick turnover of the investment. *Intermediate funds* are payable in from one to five years, and are customarily used to purchase machinery and equipment. *Long-term* funds, usually invested in land and buildings, may be liquidated over a period of ten to fifty years. Short and intermediate loans are sometimes shifted to the long-term category by renewals or by refinancing as part of a long-term loan.

The task of financial management

A successful business requires both fixed and working capital. The amounts and the relations between these and other financial factors help determine the success of the enterprise. To produce its livelihood of profits, proper financial management must pay attention to the following:

1. Acquiring the proper amounts of fixed and working capital
2. Having the required capital available at the right time
3. Securing borrowed funds as cheaply as possible
4. Arranging repayments that will not strain company finances
5. Investing in uses that will promote the business
6. Controlling expenditure for profitable objectives
7. Controlling the use of profits from operations

The Financial Statement

To point up the discussion thus far and to indicate the significance of the financial ratio analyses to follow, a condensed financial statement, or balance sheet, is set forth in Figure 10.1. Most of the items on the balance sheet are self-explanatory; however, some of them are explained in the brackets following the item title. The chief purpose of the statement is to present figures for analysis so that those interested can get an accurate idea of the condition of the company from the operating and financial standpoints. Much of this analysis is based on the use of *ratios*. Ratios are not dependable as an overall picture of company affairs unless several of them are considered simultaneously. Taken as a group they may give a fairly clear idea of the current financial and operating situation. It is usually advisable, also, to consider the trends of the various ratios. For this purpose, the ratios of previous years should be compared with current ratios. Only the more important ratios will be considered here.[3]

Ratio analyses

Current Assets to Current Liabilities. Various relationships between fixed and current assets and liabilities are used to show the purported financial strength of the enterprise. One such comparison, called the *current ratio,* is found by dividing current assets by current liabilities. Until recent years, the current ratio was given great weight by bankers and vendors in deter-

---

[3] Foulke notes fourteen different ratios, *op. cit.*, pp. 156–175.

FIGURE 10.1

Hansford Manufacturing Company
Condensed Balance Sheet
December 31, 195–
Assets

Current Assets		
Cash (On hand and in bank)		$ 85,000
Accounts Receivable (Owed by customers)	$ 95,000	
Less reserve for doubtful accounts	5,000	90,000
Notes Receivable (Customers and others)		8,000
Inventories		
Raw Materials	$125,000	
Work-in-process	60,000	
Finished Goods	150,000	335,000
TOTAL CURRENT ASSETS		$518,000
Fixed Assets		
Land (owned by the company)		$ 30,000
Buildings (Owned by the company)	$150,000	
Less reserve for depreciation	60,000	90,000
Machinery & Equipment	240,000	
Less reserve for depreciation	50,000	190,000
TOTAL FIXED ASSETS		$310,000
Other Assets		
Unexpired Insurance (Paid in advance)		$ 3,000
TOTAL ASSETS		$831,000

mining their willingness to extend credit and in fixing the amount and terms. A ratio of two dollars of current assets to one of current liabilities, known as a "2-to-1," or more simply as a "2" ratio, is still considered acceptable for credit purposes. A lower ratio is questionable, and a higher is progressively more acceptable. On our sample balance sheet in Figure 10.1, the current ratio is found by dividing 250,000 into 518,000, which gives us the ratio 2.07, or slightly better than 2 to 1.

In recent years, progressive bankers have recognized that the nature of the business, the quality of its management and other nonfiscal matters must be recognized, thus minimizing the influence of the current ratio as a lending norm. A concern with a poor current ratio may be an acceptable credit risk if it has lately acquired new management with a history of successful operations. The devising of arbitrary formulas for determining the "correct" amount of circulating capital for all concerns is unreasonable, if not impossible. The management of each company must determine its circulating-

Condensed Balance Sheet

Liabilities & Net Worth

Current Liabilities		
Accounts Payable (Owed to vendors and others)		$ 75,000
Notes Payable		
To banks	$ 75,000	
To vendors	15,000	90,000
Accruals (Owed but not yet due)		
Federal Income Tax	$ 60,000	
Other Taxes	15,000	
Other Accruals	10,000	85,000
TOTAL CURRENT LIABILITIES		$250,000
Funded Debt		
4½% Mortgage Bonds (Due to bondholders)		$ 60,000
Net Worth		
Capital Stock (Due to stockholders)	$400,000	
Surplus (Earned)	121,000	$521,000
TOTAL LIABILITIES & NET WORTH		$831,000

Net Worth		$521,000
Working Capital	$518,000	
	250,000	$268,000
Cash Sales		$75,000
Credit Sales		$2,500,000
Total Sales		$2,575,000
Net Profit		$200,000

capital needs on the basis of its peculiar circumstances, relying on sound analysis and experience.

Another asset and liability ratio, known as the *acid test* or *quick ratio* relates cash, receivables and marketable securities to current liabilities. It is found by dividing the sum of the first three by the last. From the sample balance sheet (Figure 10.1), the acid test or quick ratio is calculated by dividing the total current liabilities (250,000) into the sum of cash (85,000), accounts receivable (90,000), notes receivable (8,000) and marketable securities (none), or a total of 183,000, showing .73 as the quick ratio.

As with the current ratio, this measure of credit acceptability may lead to questionable conclusions. The dynamic climate of modern business has placed increasing confidence in management rather than on financial statements. For example, a high current or quick ratio may result from withholding reasonable dividend payments. This practice may make it difficult for the company to expand from the sale of additional stock to present holders or new investors. Furthermore, when these ratios are high, they hold out a temptation to nonowning professional management to cater to its pride by investing company surpluses in speculative ventures such as grand office buildings or plant expansions which fail to stand the strain of industrial cycles.

Total Assets to Total Debt. This ratio shows in another way the coverage which the owners give to the company's creditors. From our sample balance sheet, the ratio of total assets to total debt is found by dividing the sum of the total current liabilities (250,000) and the funded debt (60,000) into total assets (831,000), making 2.7 the ratio. The relation between net worth and total debt also indicates the relative value of creditor protection. This ratio is found from the balance sheet by dividing the total debt, consisting of total current liabilities (250,000) and funded debt (60,000), into net worth (521,000), resulting in a 1.7 ratio.

Fixed Assets to Net Worth. This ratio will indicate whether too large a proportion of the net worth has been invested in land, buildings and machines. From the sample balance sheet, this ratio is determined by dividing the fixed assets (310,000) by the net worth (521,000), which fixes the ratio as .6; in other words, the company has about 60 per cent of its net worth invested in fixed assets. When investments in fixed assets are too large, not enough of the current assets and working capital will be available for current operations. This situation is common among companies which seem to be prosperous but cannot pay their current bills. If net worth includes intangible items like good will, the ratio will look still better but be deceiving. It is necessary, therefore, that the intangibles be excluded from the net worth before this ratio is considered.

Turnover of Inventory. Inventory-turnover ratio is found by dividing either year-end or average inventory costs into annual sales. Because the rate of inventory turnover is subject to fluctuation, the figure for year-end inventory could be artificially high or low; therefore, the *average* annual inventory cost is a more dependable base line for computing this ratio. A defect of this ratio — whichever way it is computed — is the fact that inventories are taken at cost, whereas sales ordinarily include a profit. However, for showing periodic trends, the ratio is valuable. It is important because an excess of inventory is a frequent cause of financial difficulties, especially if a considerable portion of it is slow moving. When this ratio is not representative of the industry as a whole, it means that either the inventory should be reduced, or sales increased. The inventory-turnover ratio for our sample balance sheet is obtained by dividing total year-end inventories (335,000), consisting of raw materials (125,000), work-in-process (60,000) and finished goods (150,000) into total sales (2,575,000), including cash sales (75,000) and credit sales (2,500,000). The result shows that inventories were turned over 7.7 times during the year covered by the statement.

Credit Sales to Accounts Receivable. The ratio of credit sales to receivables indicates the condition of collection of customer accounts. If thirty days' credit is allowed, then collections are poor to the extent that the total of accounts receivable amounts to more than the average credit sales for thirty days. The sample balance sheet shows credit sales for the year as $2,500,000 and accounts receivable as $95,000.[4] Using 360 days for the year, the average daily credit sales amount to $6,944. When this amount is divided into the outstanding receivables, it shows that fewer than fourteen days' average sales are outstanding, which is an unusually good record. If a considerable number of customers discount their bills by paying within ten days, the receivables may represent fewer than thirty days of credit sales. As with excessive inventories, poor collections tie up working capital and lead to financial trouble.

Although the ratios explained are fewer than half the number used by careful financial analysts, nevertheless if these few are computed from any adequate financial statement, a fairly clear picture will emerge of the concern's financial condition, as well as the likely defects in its financial management.

Forms of Business Ownership

The form of ownership of a business organization often makes a difference in the sources available to that business for acquiring capital funds. A sketch of the outstanding forms of ownership will help clarify the reasons for this.

Individual proprietorship

Ownership by an individual is the oldest form of business enterprise. It has several distinct *advantages:*

1. Ease of establishment
2. Simplicity of coordination through one-man control
3. No organization or franchise taxes
4. Limited governmental regulation and control

Its few *disadvantages* become more pronounced with the increasing capital needs for the operation of modern business:

1. Its growth is limited by the owner's credit
2. Its existence expires with the owner's death, insanity or bankruptcy
3. If it extends beyond one-man ability to manage, it often becomes inefficient because of the owner's reluctance to relinquish controls

General partnership

A partnership is the association of two or more co-owners in the operation of an enterprise. A general partnership is based on a contractual relationship by which the partners may act individually as agents for the concern, sharing in its management, its profits and its losses. Any partner may, by his single act, obligate the group, individually and severally. Each partner is responsible for the concern's liabilities to the extent of his private fortune.

---

[4] Credit sales become accounts receivable until they are paid.

Partnerships evolve from the inability of an individual to finance a business. As with the individual proprietorship, the partnership organization is simple, and involves no franchise taxes. Because experience shows that the partnership form is fraught with possibilities for disagreements, and because of its extinction by the withdrawal of a partner, by court order or mutual consent, the contract which establishes it should be given serious consideration.[5]

The advantages and disadvantages of the general partnership may be summarized as follows:

Advantages

1. Easily and inexpensively organized
2. Has no organization taxes
3. Relatively free of government control
4. Its owners operate the business
5. Unlimited liability promotes its credit

Disadvantages

1. Lacks continuity of operations
2. Susceptible to sudden termination
3. Partner relations potentially complicated
4. Individual liability deters investment
5. Unlimited responsibility with divided authority
6. Effective action depends on continuing harmony

The corporation

The corporation is the outstanding form of American business enterprise. Its exact origin is unknown, but usually attributed to the Romans. In a broad sense, the corporation is an association of persons enfranchised by sovereign authority to pool a part of their resources, and act as a legal entity in carrying out a common purpose or enterprise.[6] The public franchise changes the group of associated persons into a single corporate entity, or artificial person, in which capacity it has most of the privileges and obligations of a natural person, with continuity of existence in addition.

The importance of the corporation on the American business scene is of relatively recent origin. In 1800 there were 335 charters in the entire country. Of these, only 8 were issued for manufacturing purposes, the others being for banking, insurance, navigation, turnpikes, water supply and docks.[7] It was not until after the Civil War that the rapid expansion of industry stimulated organization of the corporate form. Its real impetus came with the turn of the century, when increasing demands for large-scale industry made incorporation almost imperative for raising the large amounts of capital required. By 1939, although few in number compared with the other forms of business, corporations employed about 90 per cent of our industrial workers, and contributed approximately 90 per cent of the value of our production.[8]

---

[5] The codification of decisions resulting from a large volume of partnership litigation has produced the Uniform Partnership Law, which has been adopted by a number of states.

[6] The most quoted definition is that of Chief Justice Marshall, which can be found in the case of the Trustees of Dartmouth College vs Woodward, 4 Wheaton 636 (1819).

As with other business forms, the corporation has both advantages and disadvantages.

Advantages

1. *Autonomy.* It has rights as an artificial person, among which are the privilege of suing and being sued, or owning and controlling property, and entering into binding contracts.

2. *Continuity.* In about half the states, charters run in perpetuity, unless dissolved by the stockholders or the courts. In the other states, perpetuity is practically guaranteed by charter renewals.

3. *Limited Liability.* In general, the liability of stockholders is limited to the amount of their investments. This is a distinct risk advantage over the partnership and proprietorship forms and makes it possible for corporations to attract large sums of private funds.

4. *Ownership Transfer.* The divisibility of owner interests into stock certificates (shares) makes it easy for the individual investor to buy into the corporation or dispose of his shares when he wants cash.

5. *Representative Management.* This attribute allows the owner to separate himself from the management of the concern. As a stockholder he elects the board of directors who, in turn, select managers to operate the company, permitting the hiring of specialists. It also permits expansions in the concern's capital investment without disturbing the management personnel.

6. *Flexibility of Management.* With general management a responsibility of the board of directors, the individuals engaged in the direct management of the concern can be changed from time to time without affecting, or being affected by, the stockholders.

7. *Blanket-Purpose Charters.* The development of charter purposes has been broadened so that today's corporation is no longer restricted in its activities. Before blanket-purpose charters were granted by state statutes it was customary to allow only a single purpose to the incorporating concern.

---

[7] Joseph S. Davis, *Essays in the Earlier History of American Corporations* (Cambridge, Mass.: Harvard University Press, 1917) treats the development of American corporations through 1800. George H. Evans, Jr., *Business Incorporations in the United States: 1800–1943* (New York: National Bureau of Economic Research, Inc., 1948), covers the last century and a half.

[8] Harry G. Guthmann and Herbert E. Dougall, *Corporate Financial Policy* (2nd ed.; New York: Prentice-Hall, Inc., 1948), p. 9. Many other comparative details on the same subject may be found in the U. S. Census of Manufacturers.

Under this plan, any new or additional purpose had to be applied for under the statutes.

8. *Transfer of Control.* The share method of evidencing ownership makes it easy, technically, to transfer controlling ownership in the concern.

9. *Expansion without Loss of Control.* Successful concerns can ordinarily expand their capital without loss of control by the original group of investors, by selling nonvoting common and preferred stocks, and bonds.

Disadvantages

1. *Cost of Formation.* The corporate form can be both complicated and expensive in the initial stages. Money must be spent for legal, engineering and entrepreneurial talent, and state and federal organizing taxes must be paid for the act of incorporation.

2. *Taxes and Regulation.* The corporation is usually subject to heavier general as well as special taxes. Corporate earnings are subjected to double taxation, first on the profits of the company, and then on dividends paid to the stockholders from corporate profits.[9] The corporation is also subjected to many regulations by the federal and state governments.

3. *Differences in State Corporation Laws.* Every state has a voluminous section in its statutes concerning the formation and regulation of corporations. Furthermore, corporate regulations differ widely among the states. Since they are the creatures of statutory regulations, corporations encounter more difficulties in operation than do the nonstatutory forms of organization.

4. *Lack of Stockholder Control.* Although the corporation appears to be an industrial democracy, in reality the stockholders have relinquished real control through a device known as the proxy, which periodically transfers owner rights for making corporate decisions to an inside group of the board of directors, or the professional management.

Forms of Corporate Interest

The forms of corporate interest are important as representing debts of the corporation. Outstanding common stock is a debt owed by the corporation to those who are taking the primary financial risk in its future. Various other corporation debtors are represented by groups assuming lesser risks, with proportionately reduced opportunities for gain. These differences, together with the privileges and obligations incurred, should be known to all security owners.

Stocks

Stocks are of two kinds — common and preferred. *Common stock* represents that class of ownership which assumes primary risk in the enterprise. Where other security forms of ownership exist, common stockholders come last in receiving profits in the form of dividends, or any funds in event of dissolution.[10] Common stockholders control company affairs through voting rights. However, this right has been considerably diluted and dissipated through use of the proxy. The interest of the stockholders is evidenced by certificates which indicate the class of stock, the number of shares held, and their par value, unless the stock is without par value.

---

[9] The Internal Revenue Code of 1954 allows some relief in this double taxation feature by granting a partial credit, but the savings to the taxpayer are not so great as has been popularly believed.

Par values are delusive since the market value usually differs from par. Furthermore, all shares have several values, such as *par, book* and *market.* Common stock has no maturity date, so the owner can retrieve his investment only by selling and transferring ownership.

The privileges and obligations conferred upon the owner of *preferred stock* vary from issue to issue; they are always specified on the stock certificate. In the past, preferred stock has normally been nonvoting, but more recently many preferred issues may obtain voting power after the lapse of dividends for a specified period. Preferred stocks usually receive preferential treatment in the matter of dividends: in the event of dissolution they have precedence over the common; and ordinarily the preferred has a fixed dividend return, which is usually cumulative and must be paid before the common participates in earnings.

Some preferred stock is convertible into common at a predetermined price. The conversion privilege is not ordinarily exercised unless the market price of the common rises above that of the convertible preferred. It is also customary for the issuing company to have the privilege of paying off, or retiring, its preferred issues after a stipulated date, and at a price usually in excess of its par value. There are many other stipulations regarding the privileges and obligations of preferred stocks, all of which appear on the certificates of ownership.

Bonds

Bonds are long-term negotiable debts of the issuing company, customarily running for ten years or longer. They represent claims fixed in amount, maturity date and interest rate. Bondholders' claims to interest and principal take precedence over any payments to the corporation owners — the stockholders. Bondholders have no voice in the management unless the debtor defaults on the terms of payment or some other stipulation contained in the trust agreement, which specifies the conditions on which the bonds are issued. Because bonds are more secure than stocks, bond buyers accept smaller returns than would attract prospective stockholders, who are willing to take a greater risk for a potentially bigger return.

Bonds enlarge the sources of a company's funds, especially long-term funds. Since they are a prospective source of large funds at comparatively low rates of interest, they offer the stockholder-owners an opportunity to earn profits amounting to the difference between the debt and interest costs of the bond funds and the earnings of the business. This profitable use of borrowed funds derived from senior corporate obligations is called *trading on the equity.*[11] With the idea of making bonds more attractive, some issues provide for their conversion into common stock at a predetermined price.

---

[10] The interest of common and preferred stockholders is called "equity capital."

There are three general classes of bonds — mortgage, collateral trust and debenture. *Mortgage bonds* are secured by definite real property of the debtor. If the issuing company defaults on these bonds, the bondholders, under the trust agreement, may take possession of the pledged property. *Collateral trust bonds* are secured by the deposit of stocks or bonds by the debtor with the trustee for the bondholders. *Debenture bonds* are secured by all debtor assets not otherwise pledged. The word debenture signifies a debt, so that originally all bonds were debentures. However, as practice in this country tended to differentiate among the various classes of security supporting bond issues, the debenture bond lost caste as compared to the more definitely secured mortgage and collateral trust bonds, which can usually be sold at a more favorable interest rate.

Asset Requirements

Estimating asset requirements

The amounts of capital required by a company are never constant. The requirements will be different at the time of starting a business from what they will be later on; and, after the company is in operation, capital needs will vary during periods of expansion and contraction and during normal seasonal fluctuations. This variation holds true for both fixed- and current-asset requirements. To estimate what the specific needs will be, we have to take a different set of facts into consideration according to whether the focus of our interest is on fixed or current assets, but in either case the general approach will be the same. A further differentiation in treatment is necessary as between large and small concerns.

It might be assumed that fixed assets require a constant amount of investment, but because they wear out or become obsolete, capital requirements for them are only relatively fixed. Replacements may amount to more or less than the original costs, but usually more. Current assets, on the other hand, are considered essentially variable or fluctuating. They represent a fixed investment only to the extent that a minimum investment in inventory is maintained. With all capital requirements, the fixed portion is the minimum total on which the concern can get along; the variable portion is the difference between assets at their maximum and minimum. This variable portion, including cash and inventories, is the most difficult to estimate.

---

[11] "Ambitious promoters and managements have frequently attempted to control the maximum of assets with the minimum of investment. They have also been interested in increasing the return on their common stock as much as possible. The device used for these purposes has been called somewhat illogically, but by common usage, *trading on the equity.*" — Hiram L. Jome, *Corporate Finance* (New York: Henry Holt & Company, 1948), p. 156.

It is easy to understand that most incorrect estimates of capital requirements fall in the working-capital category. This is because of the elastic nature of three important factors of financial management: (1) the length of time of the production cycle, (2) the terms of credit to be extended to customers, and (3) the amount of expense accruing until the concern "hits its production stride." This "until" period tends to be longer than most organizers figure.

Estimating the financial requirements of a business is the first problem of financial management and a difficult task under the best of circumstances. Many inexperienced organizers fail to prepare for it, and many writers gloss over this phase of the subject by failing to point out its pitfalls. The initial capital needs of a company, including a plant built to its specifications, will include most of the following items:

1. Preliminaries to organization
    a. Inquiry as to social and economic factors
    b. Survey of the competitive situation
    c. Legal and engineering counsel
    d. Survey of the raw-materials market
    e. Survey of machinery and equipment market
    f. Market survey of sales opportunities
    g. Meetings of prospective investors
    h. Estimating costs of fixed investment
    i. Estimating amount of working capital
    j. Survey of security markets
2. Obtaining the charter and other franchises
3. Fees for the sale of securities
4. Purchase of the factory site
5. Architect's fees for plans and supervision
6. Engineering fees
7. Cost of the factory building
8. General contractor's charges
9. Taxes, interest and insurance during construction
10. Organization expense during construction
11. Setting up for operations
    a. Recruiting executive and supervisory personnel
    b. Recruiting the sales force
    c. Recruiting office and production personnel
    d. Machinery, equipment and tools
    e. Office furniture, fixtures and supplies
    f. Raw materials, components and production supplies
    g. Setting up accounting systems and controls
    h. Operating until the break-even point is reached
    i. Advertising
12. Legal fees and promoters' charges

It is obvious that because of their different nature, fixed and working asset requirements should be figured separately. At the same time, it must be recognized that they have a direct relationship. The fixed-asset investment will determine the volume of production, and production is important when estimating working-capital requirements. After careful planning and accurate estimates have determined the amount of assets required, the next problem is the source of funds.

Sources of capital assets

Capital is either owned or borrowed. Owned capital is contributed by those who have a proprietary interest in the business, while borrowed capital is contributed by those who have a creditor interest.

The nature of the business seeking capital influences the source to be used and the amount and kind of capital to be secured. Many sources cater to particular kinds of business, as evidenced by the establishment of "Farmers" and "Drovers" banks. The amount of capital required will, of course, vary greatly from small businesses to large, but some of the problems involved can be illustrated by the case of small businesses, which may find long-term loans for amounts under half a million dollars not only relatively expensive to obtain but difficult to negotiate in the regular long-term channels. The kind of capital required — long-term or short-term — will vary according to the purpose for which it will be used. Long- and short-term capital must be sought in different markets.

The financial market is generally recognized as "free" or "tight," or something in between. Whether it is only temperamental or bases its moods on justifiable business conditions is beyond the power of the borrower to adjust. Companies which plan their finances in advance, to avoid emergencies, can afford to wait for a favorable climate of the money market. Large concerns are usually in this position, which may account for their ability to become large. When a company with unplanned finances finds itself in an emergency during a tight money market, it is in real difficulty.

Internal Financing. Financing from earnings has several advantages and disadvantages. The use of surpluses permits expansion free from dictation of external sources. Successful expansion from profits indicates financial stability, and strengthens the company's credit position. On the other hand, it decreases the investors' purchasing power through the diminution or absence of dividend payments, thus possibly contributing to recessions. It also promotes involuntary savings in that stockholders are forced, by decision of the board of directors, to contribute a considerable portion of company earnings to expansion. Decreased demand on the money market, as a result of internal financing, also tends to lessen the number of investment outlets for individual savings.[12]

External Financing. The financial requirements of modern enterprises are so large that management must often look beyond plowed-in profits for normal expansion outlays. Until the thirties companies paid a large share of profits to stockholders as dividends. This policy made external financing a more important source of funds than it has been since that time because of a larger retention of profits for growth.

---

[12] For an excellent discussion of the economic effects of financing from internal sources, see Jome, *op. cit.*, pp. 250–265.

Demands for outside capital include funds for both initial financing and expansion. Either because equity owners (stockholders) do not care to lose or dilute their control, or because their companies need more new funds than earnings after dividends can provide, the so-called capital market must be used for the sale of long-term securities and the money market for short-term funds.

The *capital market* for long-term securities is a nation-wide financial network which attracts and distributes investment funds. The firms, individuals and institutions which comprise this network filter so many requests for capital funds that their sensitive reactions to the investment supply and demand act as a barometer of the capital market.

Investment banks of various types are one of the chief sources of capital funds from the sale of common and preferred stocks. They originate security issues, and underwrite or guarantee their sale. Occasionally they buy the whole or part of issues, for resale. They also promote corporate combinations and handle the security transactions of new concerns.

Commercial banks are still the chief source, directly or indirectly, for short-term and intermediate loans. Their commercial loan volume declined after World War I, and the resulting gap has been partly filled by the *commercial paper houses* which buy the notes of business concerns and sell them to commercial banks or other investors desiring short-term maturities. One reason for the rise of the commercial paper houses was the depression policy of the commercial banks of increasing their investments in government securities. This new trend promoted the stability and liquidity of the banks' investments whereas customer notes were often subject to more or less forced renewals.

Finance companies are often referred to as a general group specializing in different kinds of installment loans. Usually they lend on accounts receivable or installment leases given to retailers by their customers. Automobile finance companies take a large volume of these installment leases. This whole group of lenders has flourished chiefly because of the commercial banks' reluctance to accept accounts receivable as collateral. The *factor* buys accounts receivable outright after approving the credit of the debtors. All of these external credit sources are used chiefly because the borrower does not have access to regular commercial bank loans.

One advantage of dealing with finance companies and factors is the quick expansion and contraction of loans which their system offers. They do not require annual liquidation of loans as is often the case with commercial banks. When receivables are purchased by factors, the seller has less concern about credit risks and collection costs than with most other sources.

The independent *small loans company* is a relatively new source of credit for small business concerns. Sparked by the chain of Morris Plan companies, whose announced purpose was to supplant the "sharks" in the small loans field, these independents spread rapidly after 1920. By offering lower rates of interest they have attempted to displace the "42-per-cent companies" recommended in the Russell Sage Foundation report of 1916, on the basis of which many legislatures established 42 per cent as the legal maximum rate for loans of three hundred dollars or less.[13]

There are two special groups which business concerns frequently turn to for long-term funds — employees and customers. In both cases, the company's desire for additional funds is frequently intermingled with other motives. *Employee ownership of company securities* became popular during the twenties as a means for encouraging employee interest in company affairs, with the hope of increasing productivity and improving labor relations. *Customer participation in company financial affairs,* which came somewhat later than the sale of securities to the rank-and-file employees, attempted to tie an outside interest to company success. Local utility companies have been leaders in this movement, pointing out to customers that the returns on a specified amount of preferred stock or bonds would pay their light and gas bills. It is presumed that customer interest in the investment will also help decrease public antagonism to the utilities' requests for increased service rates.

Financing the Small Concern

The financial problems of the small enterprise, both at the time of organization and during the first few years of operations, are so distinct that if space permitted, an extended discussion of the subject would be worth while for the student of management. The relative position of the small concern in the economy of the nation is not generally appreciated. Figures from the U. S. Department of Commerce show that the small companies account for 40 per cent of our industrial personnel and contribute a little more than 35 per cent of the value of our manufactured products.[14] Another important economic consideration is that the smaller concerns feed the larger with materials, components and services. It may be presumed that the large companies look to the smaller for these contributions because they can buy from them to advantage. Finally, but by no means least important, small concerns represent the backbone of free enterprise in this country. Practically all large companies had small beginnings. They became large either by plowing back profits, by raising expansion capital through public subscriptions, by mergers or consolidations, or by some other form of combination.

Access to initial and expansion capital has been conspicuously denied the small enterprise. In former times, when capital requirements were not large the problem was not so important as it is today. The cost per dollar of raising the modest funds required by small companies is far in excess of the rates for the substantial amounts used by large concerns. The sources for short-term loans for small enterprises are few and far between, and often undesirable because of the high interest and service charges involved.

---

[13] For a detailed discussion of this subject, see Henry G. Hodges, *Cyclopedia on Pawnbroking* (Cincinnati: J. W. Taylor Publishing Co., 1943), pp. 25–43.

[14] See Table 2.1, p. 33.

Conclusions

All management functions are important to the general success of any enterprise, and financial management ranks high in determining that success. The outstanding problem in financing a business is adequate planning, which is vital during the organizing stages. It is difficult, at best, to determine financial requirements, and these will not be dependable in any sense unless they are guided by a comprehensive check list of the factors involved. The necessary provisions for borrowed funds in the early operating stages should be prepared for during the organizing period. Left until the concern is in operation, when results may not measure up to expectations, borrowing will be extremely difficult in the regular channels of finance.

Akin to the principles of financial management, and almost a part thereof, is an understanding of all the other principles of management. Even a plentiful money supply may turn out to be a millstone unless the other factors of scientific management are appreciated and acted upon. The sources of both short- and long-term credits must be recognized, and approaches made to them in language which those in charge will understand. That language should include the ratios discussed in this chapter, plus evidence of adequate controls based on acceptable standards. The relation of ratio analyses to inside control and outside credit sources is particularly significant to successful financial management.

QUESTIONS

1. Why are planning and controlling called the twins of finance?
2. Which, in your opinion, is the greater hazard in financing a business — inadequate assets or too much money? Support your opinion.
3. Why is it usually more difficult to secure additional funds for a new business after a year's operation than it is while it is being organized?
4. What is the distinction between current and fixed assets?
5. When are dividends considered current liabilities?
6. How do volume and the cycle of production affect the amount of working capital?

7. Explain why credit terms granted by vendors and those granted to customers have opposite effects on working-capital requirements.
8. Enumerate five outstanding tasks of financial management.
9. What is the purpose of making ratio analyses, and to what extent do they serve that purpose?
10. Why is it that the "2-to-1" ratio has lost some of its significance in modern banking?
11. What effect does inventory turnover have on working capital and the margin of gross profit?
12. How would you figure the rate of credit sales to accounts receivable, and what conclusions would you establish from your findings?
13. Under what circumstances would you prefer a proprietorship to a partnership form of organization? Support your decision.
14. Why is the corporate form in such favor with American business enterprise?
15. How can the owners of equity capital expand without diluting their interests?
16. Why are mortgage or collateral trust bonds often preferred to debenture bonds by the investing public?
17. Why is it more difficult to estimate working capital requirements than fixed assets?
18. What is the difference between internal and external financing, and why has the former received increased attention in recent years?
19. What caused the flow of loans from commercial banks to the commercial paper houses after World War I?
20. What is the current position of small concerns with respect to their financing requirements? What do you recommend for correcting the situation if you feel that it needs correction?

CASE PROBLEM

Hansford Manufacturing Company

The Condensed Balance Sheet of the Hansford Manufacturing Company is presented on pp. 182–183. It is a medium-sized concern, which has been making a line of steel products for the past thirty years, and is considered reliable by its customers and credit-worthy by its bank and vendors.

Because of a contemplated expansion, involving additional manufacturing space and machinery, the company is seeking a new banking connection. Hansford started doing business with its present bank when both were small and relatively new. Their dealings have been mutually satisfactory through the years, and the bank has lent its legal limit of $125,000 to the company on several occasions. Hansford financial needs will soon reach a figure beyond the bank's ability to service its account.

The factory addition will cost $50,000, and the new machinery will cost twice that amount. The directors feel that the contemplated increase in the volume of business will require additional working capital of approximately $75,000. Since that amount is already owed to the bank, the new banking accommodation will have to be $150,000. This is exclusive of the $150,000 which will be needed to pay for the plant addition and its machinery.

The present land and buildings are valued conservatively at $175,000, although they stand on the books at $120,000, due to liberal depreciation for tax-saving purposes. If the new building and machinery costs of $150,000 are added to the present mortgage of $60,000, it would certainly be considered an unsatisfactory risk for industrial property — a $210,000 mortgage against a probable going-concern real estate value of $175,000 plus the $50,000 cost of the addition, or a total equity of $225,000.

Adequate mortgage financing would be relatively easy if Hansford agreed to include its present and new machinery as security. However, the company's treasurer fears that such a lien might have an adverse effect on their subsequent open credit line. He may not have considered the possibility of inventories security for open bank credit.

PROBLEM. How would you advise the Hansford concern to do its new financing? After you have worked out your financing plan, prepare a justification for the bankers, based on the current ratio, ratio of total assets to total liabilities, and fixed assets to net worth, as taken from your statement as it will appear after the new financing has been completed (usually referred to as a *proforma statement*). To encourage further the bankers' acceptance of your proposition, show the company's inventory turnover and ratio of credit sales to accounts receivable as reflected by its current Condensed Balance Sheet.

CHAPTER 11

Budgetary Control

Control was defined in Chapter 9 as the process of assuring that performance corresponds with plans. It was further pointed out that controls are just as good as the standards on which they are based. Probably the single most important standard, or set of standards, that management has at its disposal for controlling the over-all activities of its company as an integrated, dynamic system is the budget.[1]

The budget is a written plan for future operations. When management draws up a budget, it is determining in advance, for specified periods of time, operating goals for the company as a whole and for each of its subdivisions. The detailed planning of estimated income and expenditures starts at the lowest levels of management and these budget segments are finally accumulated at the top of the hierarchy, where they are coordinated into a master plan. The determining factor in budgetary planning on all levels of management is estimated sales for the period covered by the budget; sales provide the income against which expenses must be balanced after allowance has been made for necessary reserves and profits.

Important as it is as an instrument of financial planning, the budget has further significance as a master plan for over-all coordination and control of the company's activities, because it prescribes in writing performance objectives for each activity — that is to say, it sets up standards for managerial control. With the drawing up of the budget, responsibility for the achievement of specific goals can be allocated to particular executives, whose actual performance can then be evaluated in terms of the standards implicit in the budget. This evaluation, in turn, can provide a basis for corrective action in the formulation of new budgets. It will be seen, then, that the budgetary process goes through what were called in Chapter 9 management's "four basic steps in the control process": setting standards, checking on performance, evaluating results and taking corrective action.

---

[1] For a comprehensive exposition of the budget as an executive control device, see Walter Rautenstrauch and Raymond Villers, *Budgetary Control* (New York: Funk & Wagnalls Company, in association with *Modern Industry,* 1950).

Throughout the following discussion of the budget, its importance as a mechanism of control should be constantly borne in mind. This pervasive aspect of the budget as a mechanism of control will be treated in more detail in discussing the assignment of responsibility for the budget. First it will be advisable to give a description of what a budget is and how a company goes about preparing one. Even at this descriptive level, its control functions will be everywhere apparent.

Budgeting versus Cost Accounting. The purposes of budgeting and cost accounting are often confused. The primary purpose of budgeting is to plan and control the *future* activities of management. The primary purpose of cost accounting is to determine costs *after* production. Cost accounting has its value in guiding prices and recommending where expansion and contraction should take place. Budgetary control fixes responsibility for deviations from a plan; cost accounting is not concerned with who is responsible. Budgeting is based on foresight, cost accounting on hindsight. Both techniques are important but in different ways.

History of the budgetary idea

The word budget is evidently derived from the French *bougette,* which is a leather bag or briefcase. Starting about 1870, the English Chancellor of the Exchequer, in reporting the estimated tax needs for the coming year, was in the habit of opening his *bougette* before the House of Commons. The association of the Chancellor's briefcase with its use on this occasion accounts for the word budget as applied to the income required to balance estimated expenses.

Although the word "budget" is of relatively recent origin, some writers claim an ancient lineage for budgetary procedure. It may be reasonably assumed that the procedure was used first in public affairs. The ancient custom was for the state to auction off the taxing rights to the highest bidder. In this way, the state knew beforehand how much money it would have for expenses during the coming period. (Of course, the high bidder who purchased the taxing rights tried to exceed this amount by as much as he could in the actual collection of taxes; this was his profit for assuming the burden of collection.) Thus, if the budget is considered only as an estimate or plan for governmental expenditure of an amount of income already received, then the ancient-lineage theory has some support.

In this country the budget first appeared about 1912 in some of our cities as a response of the civic reform movement to the dire financial plight of the cities. American business recognized the budget as a tool of management about 1922, the same time that the national Bureau of the Budget was established to control federal expenses and tie them in with estimated tax revenue. Budgetary procedures were accepted rapidly by business, owing largely to the influence of a book entitled *Budgetary Control* by James O. McKinsey, published in 1922.

It may seem strange to the novice that the relationship between income and expense as a basis for planning is a relatively new idea in business management. Until some forty years ago, that relationship was given recognition only in a statement of the financial results of operations at the end of a fiscal period. If the annual budget is a relatively new notion, thinking in terms of budgeting for long-term future planning is even more recent. Today the budget technique is also used to plan capital expenditures for improvement and expansions of equipment and buildings over a period of years.

It was only natural that financial planning should receive secondary attention during an era when the pressing problem of business was increasing production to meet public demand. Emphasis then was on making goods for an insatiable market. Today the emphasis has shifted to determining the market's capacity for consuming goods which can be made. Budgeting is more crucial when financial operations are taking place in an atmosphere of consumption uncertainty and sensitive capital markets.

Drawing up the Budget

There are several essentials which must be given preliminary consideration in establishing budgetary procedure.

1. The budget plan must be geared to the organizational setup. Overlapping or gaps in the organizational plan will largely defeat prospects for control through the budget.
2. Divisions of the budget should correspond with the accounting classifications, or vice versa, so as to present accounting details useful in controlling items of the budget.
3. The budget should conform to the business for which it purports to be a mechanism of planning and control. Such considerations as the nature and size of the business, and the characteristics of its management are determining factors.
4. The makeup of the budget should be as simple as possible. At the same time, its separate classifications must be drawn so as to identify the associated major executives for the purpose of measuring their effectiveness and controlling their management.
5. Flexibility is a prime consideration of good budgeting. It should be possible to adjust to changed conditions without unnecessary strains on the budgetary procedures adopted.
6. The independent or departmental budgets must become parts of the unified whole in order to establish an effective master plan.

Planning the budget

If budgeting is applied only to a simple listing of estimated income and expenses, preparation for its operation is not too complicated. However, even in such cases, plans must be provided for making adjustments as the budget term progresses. This is especially true when the budget is being installed for the first time. When budgetary procedure is used to fix individual management responsibilities, the preparatory work must go beyond the mere listing of income and expenses.

The first basic step in the budgetary process — planning — breaks down into two phases:

(1) Securing plans and estimates of expenses and expected accomplishments from the various departments or functional divisions represented in the budget. Plans, expenses and expected accomplishments are all bases for subsequent controls.

(2) Revising and coordinating the individual estimates into an integrated master budget, geared to company policies.

1. *Securing the Estimates.* Original budget estimates are built up from the base of the pyramidal hierarchy. The production budget starts with the foremen of the various departments; the sales budget, with the men in the field. To make production estimates worth while, the foreman must have figures derived from expected sales. He must also have complete information about his record during the past budget period, such as the average number of workers, the amount of raw materials and components, the cost of supplies broken down into usable form, and the scheduled rates of pay for each worker classification.

From such aids in making rational estimates for the next budget period, and knowing the condition of his machines, tools and equipment, the foreman estimates his anticipated needs, detailing them by name, kind and quantity. If the production goal he sets for the new budget period is going to exceed his past performance by a substantial amount, he must estimate such factors as new equipment needed. This work requires thoughtful planning, which is exactly what the budgetary method is calculated to impose. Development of our large-scale mass production created the necessity for detailed planning. Those concerns which do not indulge themselves in this managerial refinement will eventually succumb to their more progressive competitors.

2. *Revising and Coordinating.* From the lowest management levels, the budget estimates start up the steps of the management ladder, where the conferences begin. Each department head must be in a position to defend the estimates which he sends to his superiors. To prepare such a defense, he adopts a critical attitude toward the estimates of his own subordinates and calls them in to defend their figures. Their defenses are recorded, to be used in conferences at the next higher level.

So the budget work proceeds until it reaches the person or group at the top of the budget ladder. Armed with more or less complete information which can be used for comparative purposes, the budget officer or committee attempts to balance and coordinate the mass of estimates. Departments doing similar work should present their expense items in comparable units. The age of a machine is checked against the request for a new one; productivity is checked, whenever possible, on a comparative man-hour basis; cost of supplies per dollar volume is scrutinized. So the process goes on, with estimators given opportunities to protest against contemplated cuts in their requests, until the responsible budget authority is comparatively satisfied with the over-all result. Seldom is a finished budget completely satisfactory to those who shoulder top responsibility.

In the last analysis total costs of operation, including overhead, must show a margin of profit when compared to total sales. If there is a failure at this point, then selling prices are too low or costs are too high. In either case, the break-even point will be elusive unless some total change can be made in costs or sales figures. Since sales totals are probably based on competition, the expense side of the budget will likely go through another combing process. After the document is in final shape, there is one more hopeful thing to look forward to: the next budget — may it be easier to compile and more dependable in its promises!

Problems in preparing the budget

Budgetary Honesty. There is a persistent problem that springs up during the planning stage of the budget which may be termed "budgetary honesty." This form of honesty, which almost invariably appears in the first few years of budgeting, differs materially from what we commonly think of by the word. The person making detailed estimates reasons from experience that the budget officer or committee will "clip" his final figure, maybe by as much as 50 per cent. Convinced that this is going to happen, whatever he does, he doubles his true estimate. In an organization where this practice is habitual, the budget authority reasons, in turn, that many of the detailed estimates have been "padded" and proceeds accordingly to revise the estimates downward — again, as much as 50 per cent. Such practices are merely making a game out of the budget principle. Only a skilled budget officer, with experience in the concern he is serving, can handle such a situation. He must prove to the "budgeteers" that he can see behind their manipulations.

Another form of "budgetary honesty" is the determination of operating managers to exhaust their allowances during the budget term "no matter how." This nefarious practice stems from the fear that the amount of any surplus stemming from their "effective management" will be cut from their future budgets. Proper control would do just that, with suitable rewards for beating the budget allowances. The "spending-all-of-it" theory is peculiarly prevalent in large concerns and government agencies, where effective budgetary control runs counter to empire-building. This warning directive is an example:

> May 16, 1949. To reach the $—— commitment goal of 1950 funds by July 1st, Mr. —— requested that the initiation of Purchase Requests be accelerated

> since at present only $—— of the Purchase Requests have been initiated by this Division. All Division activities concerned have been given proportional target figures to shoot at.

Those making the recommendation to shoot at such a target cannot have much respect for budgeting.

Centralization versus Decentralization. A good budget should correspond with the company's organization chart. In this connection, the question of centralization or decentralization of budgetary procedures often arises. During the past fifty years there has been a shift from one operating method to the other: at the turn of the century the emphasis lay on the centralization of operations; since that time, because the rapid expansion of business has produced operating units so large that they defy adequate control, the stress has come to be placed more and more on decentralization. When the question is asked, "Which plan should the budget follow?" the answer is obvious. Budgeting emphasizes the thought processes, whereas operations emphasize action. The thought processes involved in adapting budgetary controls to over-all company policies require that such controls be centralized. Proper budgeting, in fact, aids the decentralizing process of operations through its control features. Centralized budgeting is as necessary as centralized policy-making.

Scope and Length of the Budget. Determination of the scope of the budget and the duration of the budget period are decisions for top management. The *scope* of the budget refers to the extent of its application to the enterprise concerned. Should it be applied to one or more functions or to the entire organization? This decision can be important in influencing the ultimate success of the budgetary procedure in companies where it is being installed for the first time. It is often contended that when the budget plan is being newly adopted its application should be limited to a single department, on a sort of trial run. If the trial is to be limited to a single department, sales would be the normal selection because it is the starting point for an over-all budget. If the trial is successful, so it is contended, managerial acceptance will be based on a solid foundation of experience rather than mere lip service. It is universally agreed that management's whole-hearted support of the budgetary idea is essential to its success.

On the other hand, there is a well-considered opinion that budgets cannot be used as adequate instruments of control unless they are adopted on an over-all company basis. If the company is long established and profitable, with a progressive and confident mangement team, the budget idea may be applied simultaneously to all departments with fair chances of success after careful planning and comprehensive consultation among all levels of management. Participation of subordinates from the beginning usually improves their cooperation in the execution of the plan. In any case, the simpler an effective plan appears, the more enthusiastically it will be accepted, and the better cooperation it will receive.

The *length* of the budget period depends on such factors as the production cycle, the accounting period and the general nature of the company's market. Stable market conditions permit more extended budgetary estimates and require fewer revisions. Most budgets run for one year, but many are for shorter terms where fluctuating conditions are the rule. The so-called long-term budget, running for five or even ten years, is concerned with capital improvements and expansions. It must be tied in with bond and mortgage retirements to provide an even keel for fixed capital expenditures. It is a common practice to add a year's estimates to such long-term budgets at the beginning of each new subsidiary budget period.

Winning the Organization's Acceptance. Selling the budget idea to the organization is a prime consideration. Because a budget provides standards against which to evaluate performances, it may well serve to point up members of the organization who are derelict in their duties. For this reason there may be resistance to the adoption of the budgetary idea. But, at the same time, the budget will also point to jobs well done and, if these performances are rewarded, initial resistance can be overcome. The advantages of the budget in securing coordination and balance for the organization must be made clear. It should be emphasized that a good budget is a sharp control tool, which must be used properly to be effective, and that correct use comes from experience. Otherwise, early discouragement may spoil its effective development. It is well to point out from the start that it is not reasonable to expect more than fair results the first year. Furthermore, top management itself must be completely sold on the budget idea before it can expect active acceptance down the line.

Responsibility for the Budget

Over-all responsibility

The question of who should have the over-all responsibility for budgeting and budgetary control always produces differences of opinion. Modern industry is very far from a unanimous answer to the question. In actual business practice today the prime responsibility for the budget is assigned to individuals who range in status from the company president all the way down to the cost manager. The National Industrial Conference Board, in a survey made of 93 companies in 1931, found that chief responsibility for the budget was assigned to individuals with 21 different titles.[2] The controller and the treasurer account for 51 per cent of the assignments, the controller having a slight edge on the treasurer. This range of assignments, made twenty-five years ago, points vividly to the immaturity of budgeting at that time — ten years after business accounting was stirred to action by McKinsey's text on budgetary control.

---

[2] These titles, listed in the order of frequency of choice, were: controller, treasurer, president, assistant treasurer, general manager, assistant controller, secretary, budget supervisor, assistant to the president, vice-president, auditor, factory accountant, statistician, general auditor, superintendent of plant, controller of the budget, budget director, budget control officer, manager of control department, manager of forecast and analysis department, and cost manager. — *Budgetary Control in Manufacturing Industries* (New York: National Industrial Conference Board, Inc., 1931), p. 38.

Responsibility for the budget is now customarily assigned to the controller if the concern employs such an officer. Large companies frequently have a director of the budget, while the smaller ones use their treasurer, president or proprietor if they do any serious budgeting.

It must be remembered that the idea of budgeting is still fairly new to business. As experience with budgeting accumulates and as this experience is evaluated, it becomes clear that the chief budgetary responsibility cannot be assigned at random; certain principles are emerging to guide the decisions of top management in making this assignment. For example, whenever the person in charge of the budget has other executive responsibilities, the opportunity is wide open for jealousy and misunderstanding on the supposition that he is favoring his own section of the organization. When this is true, objective control is difficult.

The job of the budget officer is primarily one of control, both in assembling the budget items and in applying them to company operations. One budget executive states the problem this way: "It means that if Promotion is the accelerator, Control is the brake. It means that if Promotion says, 'Do it,' Control replies, 'By all means, but do it economically.' "

Those who consider the budgeting responsibility from a scientific point of view are coming to choose between the controller and the treasurer. It would seem that the decision should be based on the individual's qualifications for the prime duty of budgeting, which is control. If the treasurer, who is custodian of receipts, disbursements and accounts, is accustomed to controlling his activity only through auditing, then he must learn to approach budgetary control from a much wider point of view.

Whenever possible, the controller or budget officer should have no other responsibilities. Where the concern is too small to afford such an officer, the treasurer is the likely person for the assignment. However, an independent controller is well worth his salary in any concern large enough to employ a qualified full-time person for the execution of this function. Irrespective of the budget-duty assignment, final responsibility rests with the chief executive officer of the concern. It is equally true that the person handling the budget should report directly to that chief executive.

The Budget Committee. Another consideration in connection with budgetary responsibility concerns the budget committee. Should it be used and, if so, in what capacity? The prevailing opinion is that the committee's role should be an advisory one; the committee should not be used as the budget operating agency. One authority on the budget notes: "A committee is at best a clumsy thing. Its action is slow and it tends to compromise — to split differences. To get a meeting of minds would require days on every question. It is too many-sided for executive responsibility. Like the versatile man, it seldom sees any one thing decisively enough one way or the other to take aggressive action." [3]

However, the budget committee can have important auxiliary duties. It can be very useful in helping the budget officer criticize and coordinate the budget estimates. As a group of representative executives, it can also stand between the budget officer and those whom he controls. Understanding the budgetary process from the inside, it can act as an invaluable aid in "selling" the budget to all those concerned. It can also gather criticisms of a constructive nature and report them to the budget officer for his consideration.

Lower-level responsibility

Having settled the question of where the over-all responsibility for the budget should be assigned, management must further decide how responsibility will be allocated at the next lower levels of authority.

Viewed as an executive's control mechanism, the budget must be set up so that it can be applied to individual executive responsibilities. That is, its estimates of income and expenses must be tied to those members of the management team who are responsible for the concern's various activities. As a control device, the budget is used to plan, coordinate and stimulate the management group in two ways. First, it controls the accomplishments of members of the executive group by establishing norms or standards against which to measure the total results of their efforts. Second, it compares the actual cost or expense of their activities with their advance estimates of what those expenses should be.

Stated in another way, functional estimates control functional operations, while personal estimates control the activities of individual executives or supervisors. This distinction is important to the extent that functional divisions do not always coincide with the activities of individual members of the management group, a situation which is frequently found in small or medium-sized companies, and only to a lesser extent in large corporations. When two or more functions are managed by the same individual in a small concern, it is relatively easy to hold him responsible for the operation of his multiple phases of the budget. His responsibilities cover entire activities, or even entire functions, and they are the criteria for setting up the budget.

When, on the other hand, coterminous responsibility for a single functional phase of the budget is assigned to two persons, there is an evident conflict in the personal and functional ideas for budgetary control. Since the functional basis of budgetary control is determining, both managers involved have responsibility, individually and severally, for meeting budgetary requirements. The way out of this apparent dilemma is to separate the function concerned according to the most rational plan available, and then make the budget setup correspond to the new managerial situation.

---

[3] John H. Williams, *The Flexible Budget* (New York: McGraw-Hill Company, 1934), p. 28.

Assignment of Paper Work. A word should be said here about the assignment of paper work. Wherever preliminary paper work is involved, it should be assigned to the person who has the responsibility for the area or activity to which it applies. This suggestion is made because of the common tendency to assign such jobs to that person whose workload is lightest, whether or not he is the person with the most intimate knowledge of the question at hand.

Types of Budget

There are various types of budget to meet different needs. The *fixed budget* requires that details be adhered to; a common measure of its adequacy is the number of deviations which management must recognize and accept. The *semifixed budget* permits transfer of funds from one budget item to another with greater freedom. The *variable* or *step budget* provides for two or more complete budgets based on different prospective sales volumes. This type is frequently used in wholesale, retail and production concerns. Budgets based on different sales volumes are prepared simultaneously because of top-management skepticism as to estimated sales.

The *flexible budget* takes care of different sales levels by working out ratios between sales volume and costs for individual budgetary items. These ratios are used to adjust the fixed, proportional and variable costs of the adopted budget to actual production. The fixed-cost items are relatively few, and simple in their application to various production volumes. Interest, rent and taxes are illustrations of items which rarely fluctuate with production. Proportionate relationships are also few in number and easy to compute because they vary directly with volume. Direct labor and materials, discounts, and some supply items fall in this category. Because variable costs do not move in any direct relation to changes in the volume of production, they are the most difficult for which to determine expense ratios. An example of this third category would be the ratio of indirect labor costs to production volume.

While ratio determinations for variable budget items require considerable work, they can save time in the long run. The time spent in computing expense items for step budgets depends on the number of budgets to be set up. Both the step and flexible budgets recognize the effect of volume on unit costs and are predicated on the desirability of periodic budget revisions based on different production levels.

The *lump sum budget* assigns allowable expenses in lump figures to departments or activities, while the *detailed budget* breaks down the expense assignments into detail for more refined control. *Scheduled budgeting* assigns time periods for the use of expense items. These budgets may be divided into monthly or other time-limiting installments for the guidance of designated activities. The purpose is to prevent abnormal or total use of the budget allowance before the end of the budgetary period. Such expenditure limitations reflect management's lack of confidence in the using departments. The lump-sum budget, on the other hand, recognizes competence in the using departments and promotes initiative.

Overhead Control. Of all the expenditures related to production volume, overhead is probably the most difficult to determine. Its allocation to various activities on the basis of any total budget is difficult in itself. If really scientific control of expenses on an activity or unit-production basis is desired, allocation of overhead should be established on an exact basis, and this is practically impossible. The real problem is assignment of overhead expenditures under constantly changing conditions, which represents the actual situation. It is unusually difficult to relate a given amount or the rate of overhead to units of output because the solution is ordinarily complicated by many related problems. However, predetermined budget amounts, or rates, are the only effective tool which management now has for controlling overhead expenditures.

Functional budgets

The over-all operational budget is customarily divided into a number of functional budgets for the control of such activities as sales, purchasing, production, materials, labor, manufacturing expense, plant and equipment, and financial management. Each of these will be discussed briefly to show the application of estimating and controlling to these activities.

The Sales Budget. Budgeting starts with sales. The sales budget comes first because of its importance to both production and finance. To assist production and finance, the total sales budget should be expressed both in units of goods and dollars of sales. The first acts as a guide to production, and the second is one basis for the distribution of expenses. Since sales always represent the bulk of the concern's income, they are obviously the determining factor in many of top management's budget decisions.

Compilation of the sales budget starts with the men in the field. In spite of the exaggeration that might seem to be a concomitant of the average salesman's prevailing optimism, it is presumed that he has a better knowledge of the sales potential in his territory than anyone else in the organization. However, the salesmen's estimates are reviewed up the management line, just as are those of the individual foremen in the production department. If the company has a national distribution, salesmen's estimates are first reviewed by the district sales managers. Unusual alterations should be made only after conferences with the salesman concerned. After review by the district sales manager, a more objective criticism is made by the general sales manager, and finally the estimates are reviewed by the budget committee — if there is one — and the chief executive.

What are some of the criteria which enter into revisions of the field estimates? One is the general condition of the market. This guide should be established by what is called a market analysis. Buyer markets for both production and consumption goods are dynamic and subject to changing emphasis. In addition, shifting populations may have a marked effect on prospective sales in specific territories. A change in the nature of the population is another important consideration. Whether sales involve the wholesale or retail trade, it is desirable to know the purchasing power of various sections of the country. Changes in consumer demand, bank deposits and the scale of earnings all have an effect on sales. The standard of living of the local population is another factor. All of these are taken into account when reviewing the estimates of salesmen in the field. Appreciation of these factors by the individual salesmen helps put customer relations on a more rational basis.

Sales budgeting helps guide company affairs in many other ways. The likelihood of a future sales slump in items produced by industry or sold by retail concerns serves as a signal to look around for other items to take up the slack. A slump in the regular line may be due to changes in buyer habits, or to a change in general business conditions. To meet these conditions, a decrease in selling prices may be in order, or some new item may be added, even without profit, to keep the organization intact while waiting for better markets. On the other hand, a large expected increase in sales may have a serious effect on the manufacturing company's production facilities or its financial standing. If the volume of sales is greater than productive capacity, then plant expansion is considered — if finances permit and if the market gives promise of holding up to the new estimates. Plant expansion and increased sales both require more capital. The first demands greater investment capital and the latter requires more working capital for the purchase of raw materials, cost of labor and carrying of customer accounts.

The *sales estimate* is the amount of prospective sales as determined by the various levels of the sales department. The *sales quota* is the prospective amount of sales assigned to each salesman or territory. The *sales budget* is the figure finally determined on after the several reviews of sales estimates. All three of these figures are only relatively correct. They represent the best judgment based on experience and an analysis of the general market and its territorial divisions. Because of the close connection between sales on the one hand and expenses and general finances on the other, it is clear that the concern's stability is dependent largely on the accuracy of the sales budget.

The cost of sales, or *sales expense,* is the other half of the sales budget. Cost of selling is based, to a large extent, on previous sales volumes. The average cost of unit sales is the fundamental guide. Deviations from this norm result from decisions as to whether the sales effort in particular territories should be intensive or extensive. If certain sections appear to have increased sales potentials, additional expense may be allocated for intensive development. If, on the other hand, experience shows that specific territories have been canvassed at a loss, it may be decided to reduce the funds allotted to these territories and continue sales only on an extensive basis, getting whatever business is available on a low unit cost of sales.

Advertising Budget. The advertising budget may or may not be a part of the sales budget. More often, its total is determined by top management as a given percentage of expected sales. Distribution to the various media of advertising should be decided by top management in consultation with the general sales manager. It is obvious that the amounts assigned to different advertising outlets will vary considerably with the type of business.

Production Budget. The importance of the production budget ranks second to sales, on which it is dependent. When the sales budget is divided into time periods, the scheduling of production is materially aided. If anticipated sales are not estimated on a monthly basis, for example, production is likely to lay off workers when business drops off for a while; whereas a month-by-month estimate may show that the slack in sales is likely to be only temporary and, consequently, there need be no interruption in the level of production. The accuracy of sales prognostications also helps in placing large orders for materials at advantageous prices. When plant operations are maintained at an even rate, many savings result. For example, overtime work at premium wage rates may be avoided. Employment of a steady worker force reduces training costs and maintains productivity on a higher level. Furthermore, the regular use of machinery reduces maintenance costs and improves productivity.

Compilation of the production budget has already been discussed. In general, the figures start with the foremen, subject to review and revision up the production-management line in the same fashion as the sales budget. One marked difference in the making of the two budgets is that production has a more definite basis from which to work, in the estimates which it receives from sales.

Materials Budget. Materials are divided into *direct,* which become components of the production process, and *indirect* or auxiliary items, consisting mostly of supplies. Indirect materials are often included in a manufacturing expense budget. In either case, the budget will depend largely on the materials called for in the production budget. Besides being of direct service to production, the materials budget is used by purchasing and finance. When the materials budget is set up on a scheduled basis, with weekly or monthly delivery dates, purchasing can have better control over price, quality and delivery dates. Since purchases may total from 30 to as much as 90 per cent of total costs, the materials budget is important to the person responsible for having cash available to meet purchases.

Purchase Budget. Estimates of required materials, supplies, tools and equipment come mainly from the production department. However, most departments report items which must be purchased, and all such estimates are working guides for the purchasing department. If the required items are scheduled on a time basis, purchasing can do a much better job. Some purchases must be made well in advance to meet sales or production schedules. Other items have fluctuating market prices, in which case a time schedule of requirements aids in placing orders under advantageous market conditions. The problem in scheduled buying is to match deliveries with requirements so that work will not be interrupted. Obviously, purchasing will have its own expense budget.

Labor Budget. Labor is also classified as direct and indirect, or productive and nonproductive. Indirect labor serves the workers who are engaged directly in the production processes. As with indirect materials, indirect labor is commonly included in the production expense budget. The amount of direct labor for the various classifications is estimated, in the first instance, by the foremen. Labor requirements are expressed both in dollars and numbers, since labor estimates are used by the personnel department for recruiting.

Experience with labor turnover aids in estimating the requirements for additional workers. The sales budget supplies the information which indicates the number of workers who will be needed in the various job classifications. From the number on hand at the beginning of the budget period is subtracted the estimated number of separations that will occur. When this result is subtracted from the average number required for operations during the budget period, the difference represents those whom personnel must recruit during the year. When labor requirements are set up on a time schedule, personnel is better able to plan its recruitment. If the company has a planning, or engineering department, it may be assigned the task of making up the labor budget.

Production-Expense Budget. Production or manufacturing expense, formerly referred to as "factory overhead," but currently called "burden," encompasses a number of items which do not vary proportionately with the volume of production. Indirect labor and materials have already been referred to as such items. Others include superintendent and foremen salaries, supplies, maintenance, material handling and clerical help. It is important to know the relationships between the cost of these items and the volume of production. Cost accounting is very much interested in such ratios. Personnel and purchasing are also interested. In large concerns, engineering or planning is responsible for figuring these ratios, which is not a simple matter.

Relationships between overhead costs and production or sales volume are sometimes important in connection with incentives. Many industrial concerns figure the foreman's bonus not simply on the basis of his department's productivity, but also on the amount by which he is able to beat overhead or burden targets set for him in the budget.

This leads to another consideration of expense items. Some of them are relatively fixed, irrespective of volume of business. Salaries are an example. The same is true of "rent" when charged to manufacturing expense. The cost of clerical help varies only within narrow ranges. Because all of these are items over which the supervisor has no control, they should not be included among the variables which are considered in rewarding or punishing his management.

Plant and Equipment Budget. This budget, as has been suggested, covers a longer period than other budgets, although that portion which applies to the current period may be included. Expenditures for expanded plant and equipment are capital items for which budgetary planning is just as important as for current items. Capital budgets may be estimated for from five to ten years, with a new year added at every annual budget period.

When this type of budgetary planning is not used, poor execution of expansion programs will result, as well as unnecessarily high costs. It frequently happens, especially when greatly increased sales result from war production, that management will go into an expansion program without adequately studying its postwar market. The same may be true to a lesser degree in time of peace. In either case, owners and management frequently lose control of the business because of such foolhardiness.

Common sense suggests budgetary planning of capital expenditures. Looking ahead, management can draw on reserves taken out of profits to finance a planned building program carried out at a time of low construction costs.

Finance Budget. The financial budget summarizes the results of all the other budgets, its purpose being to show the financial condition of the concern at the beginning and end of the budget period. If the individual budgets are set up on a scheduled basis, the financial condition may be shown for each month of the budget term.

It includes a summary of all estimated receipts and expenditures. It furnishes the over-all control for top-management guidance in all operations of the company. It provides the picture which can be used as a guide in borrowing, in payment of dividends, and in determining the transfer of profits to the various reserve funds.

Conclusions

Purpose of Budgeting. Budgets are the financial results of planning. Plans include standards, which are used for control. However, budgets are not automatic controls. They must be used by management to compare results with estimates. Control is the technique used by both administration and management to keep informed about the results of their plans and directives. The emphasis on control is to obtain current figures soon enough to use them for planning changes when necessary. Controls will be relatively ineffective unless the subordinates in the hierarchy have been indoctrinated with the budgetary idea. Effective control, therefore, requires more than bare figures. From forecasting to planning, to organization, to direction and finally to control is the logical process for effective management.

Advantages of Budgeting. Because budgeting is planning, and because planning requires thoughtful analysis, the process is stimulating to those who participate. The entire management team sees the business as a new and complete picture. Cognizance of relationships is a helpful stimulant to managers.

Control is a purpose for which budget planning furnishes the means. Since control requires standards, responsible members of the management team have fixed goals for accomplishment. Meeting goals produces satisfaction from a job well done. Exceeding goals is an added stimulant which produces initiative.

Planning, coordinating, stimulating, controlling, and fixing of responsibility are the five outstanding advantages of good budgeting.

Dangers in Budgeting. When sharp tools are used for the wrong purpose, or when their use is not understood, they can become dangerous weapons. This is true of the budget tool. One trouble is that too much is expected of it too soon. Another is that too many of the management team pay lip service to it rather than give it the things of the spirit. This attitude may result from two causes, one of which is misunderstanding, and the other, aversion for new and untried processes. The latter often results in untouchable sabotage such as that previously described as "budgetary honesty."

QUESTIONS

1. How would you define the budget? What is its primary purpose?
2. What is meant by the statement that budgets should be used for controlling both activities and the members of management? How can the budget be arranged to accomplish these results?
3. What are the four essential steps in budgetary procedure?
4. What is the essential difference between budgeting and cost accounting?
5. Why was budgeting so delayed in this country, especially among business enterprises? Where did it start in the United States, and why?
6. Enumerate five requirements for good budgeting.
7. Explain the actual operations in preparation of the budget.
8. What is meant by "budgetary honesty," and how does it affect budgetary controls?
9. Why should any function or activity attempt to "come out even" on its budgetary allotment? To what extent should the supervisor of a "100-percent" budget-spending operation be rewarded for his skill?

10. Should budgeting and budgetary control be centralized or decentralized? Why? Would your answer be the same for General Motors and the DuPont Company?
11. Should the first budget be applied to only one or two functions, or cover all operations? If it should be tried out in one function, which one would you select?
12. Which member of the management group, in your opinion, should be responsible for the budget? Does the size of the concern make a difference in your reasoning?
13. What purpose is served by a budget committee? Should it operate along with a budget officer or independently?
14. Why is budgetary procedure more involved when it includes the coordination and control of related activities?
15. What is the purpose of the step budget?
16. Compare the lump-sum and scheduled budgets.
17. Which is the most important of the functional budgets, and why?
18. Why is it reasonable to revise budgets after they are in operation?
19. What is the relation between the sales and production budgets?
20. Explain the difficulties encountered in preparing the labor budget.

CASE PROBLEM

Bon Marché Company

The Bon Marché department store has recently begun a study of the cost figures involved in operating its business. Although sales have been increasing, profits have been decreasing. The vice-president in charge of operations is convinced that expenses have not increased percentagewise when compared to expanding sales. He believes that responsibility for the loss of profits must be placed on the sales end of the business. Below are the figures for operating expenses and sales for the past fourteen years.

Year	*Expense*	*Sales*
1940	$ 415,000	$3,458,333
1941	420,000	4,200,000
1942	380,000	2,714,300
1943	410,000	3,410,000
1944	575,000	4,790,000
1945	610,000	5,075,000
1946	715,000	5,910,000
1947	770,000	7,010,000
1948	780,000	6,500,000
1949	715,000	5,960,000
1950	725,000	6,610,000
1951	820,000	6,540,000
1952	875,000	6,750,000
1953	1,020,000	7,897,000

To discover the true picture, it will be helpful to make a comparative graph of the sales and expense figures for the years given above.

PROBLEM. Compare changes in sales volume with what should be expected. Consult the Survey of Current Business to determine whether the store has been making reasonable progress with its sales volume. Has the ratio of operating expense to sales been held down as the operations executive claims? Prepare a report for management on your findings, together with recommendations.

CHAPTER 12 Location and Layout

Location and Relocation

Many of the factors influencing the location and relocation of industrial plants are also important in the selection of locations for retail and wholesale offices, warehouses, and stores, especially when the size of the establishment warrants consideration of new facilities. Selection would be easy if one could believe the promising descriptions of their territories set forth in the magazines and newspaper advertisements of railroads, city, state and regional associations or state and local chambers of commerce.

Gift horses

Railroad companies are most likely to give enquirers factual information about sites along their lines. Local chambers of commerce are most likely to "puff" the location opportunities they have to offer. They frequently go further, offering free locations or relief from local taxes for a period of years. An industrial magazine warns that "deluged with offers of heaven, earth and sewerage systems, companies are eyeing bids from communities with delight or suspicion." The final gauge in selecting a plant or business location should be its effect on profits.

The same industrial magazine, discussing how to pick the right plant site, suggests that aerial photographs offer one possibility for guiding selection. A professional aero service supplied the picture which helped the Bethlehem Steel Company to decide on its new location near Sparrow's Point, Maryland. The photo brought out the site's advantages in highway, railroad and waterway transportation, which are important for heavy industries.

The location problem can be subjected to scientific analysis, an approach of recent application. The older rule-of-thumb criteria attached weighty considerations to such factors as cheap labor and lax labor laws, tax exemptions and free land sites. Experience has shown that, though these varieties of bait are highly palatable, they serve as a rule only to cover up a most indigestible hook. Too often, for example, cheap labor means impoverished communities with inadequate local services and shifting populations. The workers who remain in such localities do not represent a group which can be depended on for steady work or low-cost production. Modern labor demands and receives favorable living conditions.

Low taxes point to poor community services. Tax-free offers suggest that someone else is carrying the community tax burden for the business newcomer, who will shoulder the same burdens for other newcomers in the future. Adequate public services are necessary to attract capable workers, and they must be paid for from public revenues. When one group escapes these legitimate levies, some other group makes up the difference.[1]

Cheap labor is often considered synonymous with the absence of labor unions. For some years this condition has led new industries to the South. Recent events demonstrate that the national labor organizations will continue their efforts to organize the so-called cheap-labor markets until their wage standards compare favorably with the rest of the country. Unions are forced to this program to satisfy their membership located in the higher wage sections of the country. Furthermore, regional cost-of-living differentials are fast disappearing. Wages and standards of living go hand in hand, and living standards frequently determine the quality of the labor group. Gift horses invariably offer deceptive, short-run advantages for the location of business or industry. Business advantages cannot be based on labor exploitation, freedom from local taxes, or free land.

Relocation

[It is customary in certain circles to believe that any change is an improvement. Possibly a scientifically prepared comparative analysis of the present and the proposed locations may show no long-range advantage in the move. Industrial relocations are both expensive and disrupting.] While the official representatives of many towns and cities are clamoring for new industries, others are antagonistic to their invasion. A conservative citizenry will supply mostly disappointment for business newcomers. Also, the local desire for new industries can be anything but rational when there is a tight labor market or lack of community facilities such as sewerage, housing and recreation.

When General Motors was considering the establishment of a new gray iron foundry in either Defiance or Tiffin, Ohio, it inserted help-wanted advertisements in the local papers to measure the available labor supply in both places. The first two days brought 833 applications from Defiance and only 536 from Tiffin. Numbers alone did not settle the question, because General Motors was also interested in the quality of applicants.

If a new plant is involved in the contemplated move, it may be that building costs are so high, compared to the cost of the present plant, that a new and continuing overhead will be added out of proportion to the advantages gained. If the new location is in another section of the country, moving costs must be taken into account for both the company and its workers. Time required for the move may mean a considerable loss of profits and occasionally of customers who are forced to seek new sources of supply. When skilled workers are prejudiced against the new location, they may not move, even when the employer pays the bills. Human associations and home investments will influence employee feeling toward the new location.

---

[1] For an excellent discussion of this aspect of the tax problem, see Joseph S. Floyd, Jr., "The Effects of State and Local Taxes upon the Selection of Industrial Locations," *Proceedings,* Forty-fourth Annual Conference on Taxation (National Tax Association, 1951).

Finally, some workers who make the change may regret it, with detrimental effects on their health, happiness and productivity. If one of the reasons for the change is low-cost labor, the anticipated bonanza may not materialize either in quantity, quality or price. All of these factors, and many others, may influence a decision against the move after an objective analysis has been made. Green pastures must usually be fertilized, and fertilization may be cheaper and more effective in one's own back yard.

Location fundamentals

What factors are fundamental in analyzing a new plant site? The following list is a minimum guide:[2]

1. Objectives sought
   a. Production advantages
   b. Financial advantages
   c. Raw-material sources
   d. Finished-product markets
   e. Required labor supply
2. Type of plant required
3. Areas considered favorable
4. Data summaries of cities and towns
   a. Facts from consultants
   b. Community attitudes
5. Data summaries of sites
   a. With and without buildings
   b. Aerial photographs
   c. Detailed field notes
6. Weighting of characteristics involved
7. Final summary
   a. Comparative site costs
   b. Comparative operation costs
   c. Comparative labor supply
   d. Comparative transportation facilities
   e. Comparative living conditions
   f. Weighted ranking of sites considered

---

[2] This subject is expanded in B. H. Shaffer and H. W. Lormer, "Pre-planning for Plant Location," *Factory Management and Maintenance,* Vol. 106 (October 1948), pp. 95–102.

The DuPont Company considered eighty-three factors in locating a plant at Kingston, New York. The breakdowns under the six general headings suggest the kind and amount of detail required for a comprehensive study:

1. LABOR
   - *Supply*
     - Availability
     - Capability
   - *Wages*
     - Construction
     - Operations
   - *Disposition*
     - Labor relations
   - *Housing*
     - Availability
     - Sanitation
     - Stores
     - Schools
     - Churches
     - Recreation
     - Hospitals
2. TRANSPORTATION
   - *Rail*
     - Schedules, spurs
     - Yards and switching
   - *Water*
     - Channels
     - Docks
     - Carriers
   - *Highways*
     - Access
     - Regional
     - Bus lines
     - Freight lines
   - *Air*
     - Airports
     - Airlines
3. RAW MATERIALS
   - *Consumption*
     - Quantity
     - Source
     - Cost at source
     - Freight
   - *Inventory*
     - Working capital
     - Storage facilities
   - *Other Industries*
4. FINISHED PRODUCTS
   - *Production*
     - Sales forecast
     - Pattern of distribution
     - Freight
   - *Inventory*
     - Working capital
     - Storage facilities
5. POWER AND UTILITIES
   - *Electricity*
     - Availability
     - Dependability
     - Cost
   - *Gas*
     - Availability
     - Dependability
     - Cost
   - *Steam*
     - Purchase cost
     - Availability
     - Fuel cost
   - *Water*
     - Quantity
     - Quality
6. PLANT REQUIREMENTS
   - *Acreage*
     - Initial — ultimate
   - *Soil*
     - Drainage
     - Foundations
   - *Natural features*
     - Topography
     - Climate
     - Flood risks
   - *Waste disposal*
     - Minimum stream flow
     - Regulations
   - *Government*
     - State & local taxes
     - Building code
     - Public debt

General Area. In determining the area of location or relocation, the first step is to list the requirements considered vital. Then the search starts for a general area in which these needs can be satisfied. For reasons which have already been outlined, it is important that the change shall be an improvement if a relocation is involved. Locations are important for the simple reason that any site decided on should be considered permanent. A change may involve the sale of the old location, which represents only one of the possible expenses of the move. It must be understood, also, that the main factors governing selection apply to small as well as large enterprises.

Since the purpose of business is to make a profit, that is the acid test in any final decision. In the main, profits are based on the costs of delivered goods and competitive selling prices. If the trading area is small, selling prices are important. If the product is sold nation-wide, the location assumes importance as a national distributing center from the standpoints of transportation facilities and costs.[3]

The Markets. The choice often has to be made whether to locate the firm close to the sources of raw materials or near to the markets for finished goods. When the product is bulky and heavy in relation to its value, the finished-goods market may receive prior consideration because of transportation costs. On the other hand, the location of raw materials may be a factor of great weight, irrespective of distribution costs of the finished product. The location that favors both of these considerations is always a wise choice, other factors being equal. When the question of raw materials is paramount, distribution costs may be kept within reasonable bounds by establishing scattered warehouses. The automobile industry uses this plan in setting up assembly plants strategically located with respect to the customer market. The establishment of branch manufacturing plants reduces distribution costs and improves customer services. Finally, small concerns depending on local customers find it desirable to give more weight to the finished-goods market rather than the source of raw materials.

Transportation. Most advertisers of plant sites mention the transportation facilities they have to offer. Different kinds of businesses will have varying preferences for transportation by rail, water, road or air. Immediate accessibility, connecting facilities and rates must all be considered in a site-location study. The relative importance of the different kinds of transportation depends on the type of business to be served. However, with the recent developments in air transportation, planes are able to carry heavier commodities each year — apparently at justifiable rates. In any case, a nearby airfield serves potential emergency needs for many concerns, not excepting the machine-tool industry.

Labor Supply and Wage Rates. An adequate labor supply means the availability of those types of workers necessary for the purpose intended. The extent to which such a supply is at hand lessens the training problem in the new location. The Puerto Rico Trade Commission advertises training facilities because its population is largely unskilled. Since manufacturing industries use a major proportion of machine operators, the training problem is not always serious. Other things being equal, a business may locate where the available supply of workers can be trained quickly by those key employees who move with the establishment.

---

[3] An excellent résumé of this problem, written from the economic standpoint, is Melvin L. Greenhut, "Integrating the Leading Theories of Plant Location," *Southern Economic Journal,* Vol. 18 (April 1952), pp. 526–538.

Wage rates are important from the standpoint of competitive costs. If the available labor supply consists of highly skilled workers, they will not be interested in machine-operation jobs except at wage rates the concern cannot afford.

It is important, however, that the wage rates in the new community be commensurate with the type of work required. If the shifting concerns feel that they can use local labor at rates prevailing in an unorganized field, they may be due for a disappointment after the worker demand they create leads to union organization. It follows that any study of location possibilities should not lean too heavily on wage rates that are obviously below the average level for the industry concerned.

A steady, home-owning employee is clearly the most desirable. Since labor turnover adds to costs, contented workers with families and home roots in the community are to be preferred. The percentage of home owners is a valuable figure to know in gauging the labor market.

Power Supply. Most manufacturing concerns, and many other types, require adequate power at competitive prices. It is more advantageous for the power supply to be dependable than that it be located near the new site. For this reason, access to a large electric power supply is often favored. But the sources of the power are not always decisive, especially when they are located far from raw materials and sales markets. TVA power has not attracted large plants for this reason. The same is true of the large power potentials in some parts of the West. Niagara Falls, on the other hand, has other features besides cheap power to offer industry and has experienced a commensurate industrial development.

Business Neighbors. There are many advantages accruing from a site surrounded by businesses in the same line. Most distributors of cotton piece goods in New York City are located within a few blocks on Canal Street. It makes both buying and selling easier. Every merchant picks up discontented customers from his competitors when they are in the immediate neighborhood. Members of the "trade" can keep in closer touch with changing markets, thus helping to stabilize their line of business.

Manufacturing, wholesaling or retailing enterprises experience some of the following advantages or disadvantages by being near their competitors.

1. *Financing is easier* because local banks understand the special trade with which they do a general banking business.

2. *Sources of supply* are more numerous and better able to serve grouped concerns in the same line. Yarn salesmen visit oftener those localities where

hosiery or other textile mills are concentrated. It is to the companies in a textile community that the salesmen offer odd lots and other advantageous buys. It is also in these communities that the yarn houses establish warehouses for better and quicker service to customers.

3. *A ready and advantageous labor supply* is available to a group of similar businesses located in the same territory. Labor relations may be strained in these communities, but training costs are reduced. If the type of industry involved is highly organized, it may be that labor trouble in one industry will affect the entire group. This is an outstanding disadvantage.

4. *Waste and by-products* may be more easily disposed of, and at higher prices, because complementary concerns will be set up in such areas to utilize these offerings.

5. *Power and transportation facilities* are likely to give better service to a group of business customers.

Taxes. Taxes are part of the operating expense of every business unless the community has exempted newcomers for a specific period. Even then, as has been suggested, the new company may find itself paying higher levies at the end of the grace period. The amount of the tax is not so important as the services that are supplied for a given rate. However, the popular clamor to "soak the corporations" lends credence to the observation that "the power to tax is the power to destroy." With this in mind, it is prudent for the business analyst to find out something about the attitude of the local populace and its taxing authorities.

Climate. Climatic conditions may influence the manufacturing processes involved, or the contentment of the workers, or both. Textile plants were located in New England because of its moist climate. Today we can create the desired production atmosphere within the plant. It appears that many of the moves to the southern part of the country are due partly to the favorable outdoor living climate. In any case, care should be exercised to avoid climates that are too dry, wet, cold or warm for comfortable living.

Housing Facilities. This is naturally a weighty consideration in making a business move. In some cases where other factors make the move appear advantageous, but houses are lacking, the company may decide to provide its own facilities. This is the kind of investment that only large and well-established concerns can afford. Occasionally, the plant-hungry community may agree to provide proper housing for the new workers.

Education and Recreation. The site seeker neglects to consider educational and recreational facilities at his peril. With the human side of business attracting more attention, these former luxuries have become everyday necessities. Labor unions are setting the pace in this field by demanding that employers see to it that they or the community provide these essentials in the always rising American living standards. Recreational opportunities may be supplied naturally in some regions. Educational opportunities have become so important with organized labor that it is fostering educational programs of its own, often focused to a special purpose. Some foreign labor unions have set up grade schools for children of members. Adult-education courses are always an attractive inducement for the average worker group.

Local Government Activities. This is a worth-while consideration for the long pull. A small community in Pennsylvania lost its only large industry because the city council would not allow the purchaser to build a bridge across a side street to connect its two buildings. The plant's equipment was moved to a distant city, offering the not particularly attractive opportunity for many of its employees to follow their jobs. Local capital bought the dismantled plant and established two businesses in the separate buildings, and both proved unsuccessful. In this case the small town and its council felt that it should not be ruled by "foreign" capital. Similar cases, varying only in details, are not difficult to find. Local communities whose officials are likely to be antagonistic to newcomers should be avoided.

Plant Size and Location. The continued expansion of some business organizations leads to physical units so large that eventually coordination and control become difficult. The advantages of large-scale individual operations finally reach a point of diminishing returns. For this reason expanded businesses sometimes decide to decentralize their operations with centralized control in the home office. These decentralizing tendencies naturally lead to plant-location problems.

In addition to the general over-all management problem, decentralization may be influenced by one or more advantages suggested by economic studies of areas some distance from the home office. Since the world situation is so fraught with rumors of war, decentralization has been given a new stimulus for security reasons. Several European countries have been systematically scattering their industries ever since World War I, to obtain better security from enemy mass destruction of their production facilities.

There is also a growing relation between the size of the business and the type of area for optimum operations. For example, it is customary for small companies to locate in large cities. With a minimum of capital for investment, they can rent space in loft buildings. The city usually offers better opportunities for employing trained workers. It also affords easier banking credit. Foremen and machine operators in the various trades are available in large numbers. There are other advantages for small concerns in large cities.

Large industries, and even large office buildings of insurance companies, are moving to rural areas in increasing numbers. When they are well financed, they can establish desirable housing and stores and places for amusement, education and recreation. The Hershey Chocolate Company built its own community around the plant at Hershey, Pennsylvania. The latest trend is for such companies to locate where they can buy large tracts of land at reasonable prices. Their subsequent community developments often enable them to reduce their permanent investment by selling the surplus land holdings at a substantial profit.

The medium-sized concern customarily finds its best area in the suburbs of some town which has the desired facilities which the medium-sized company cannot afford. The small and the large companies find distinct advantages in large cities and rural areas respectively, while medium-sized companies are seeking the suburbs of average-sized towns.

Conclusions

Original plant location, or relocation, is a major decision and should result only from an exhaustive study of all the factors discussed. Since these factors have different degrees of importance with various companies, they should be weighted in relation to their contributions to the total scheme. The sum of the value characteristics of the factors, figured on a weighted basis, should give comparative total scores on which a rational decision can be based. This formula is easier to express than it is to apply in practice. Furthermore, if the total scores of the best of the proposed locations are compared with that of the present location, some relocation ideas will be abandoned. Plant locations should be made on the basis of long-range advantages. Long-range location mistakes are almost impossible to correct because of the inroads they make on invested capital, leaving operating capital in a precarious condition.

Layout

Planning the layout for today's business operation involves general principles and technical tools scarcely heard of forty years ago. It was once the custom to build a strong, imposing factory building, office, store or warehouse, and then fill it up with the equipment or furnishings. Currently, the placement of machines, departments, work centers and storage spaces, personnel offices, washrooms and material-handling equipment are all planned in advance; the building is then "wrapped around" the completed layout. This is the functional approach to architectural planning.

The layout planning of production processes and other business operations has, as its basic tools, the flow chart and the layout pattern or diagram. The layout pattern employs some form of the template for the floor plan, and three-dimensional scale models for the completed job. The final planning development for a multiple-story structure includes models of the various floors built in transparent plastic drawers which are slid into the three-dimensional framework. The flow chart, which will be referred to in more detail later, pictures in graphic form the sequence of operations.

To meet modern competition, planning the floor layout must involve more than placement of machines and equipment. Two important considerations are *material handling* and *processing* or *production methods.* With material handling representing as much as 25 per cent of labor costs in many industries, the machines and equipment used in modern material handling must be given major consideration in planning the layout of many operations. Aisles, elevators and the utilization of overhead space must be planned in advance as well as the placement of such equipment for internal transportation as moving aprons, chutes, cranes and monorails.[4]

Floor and other plans must conform to *methods* used in the manual and mechanical processing operations. Methods affect the placement of both the operator and his workplace, and the storage of parts for assembly, to mention only a few of the relations between methods and layout. The problem will be dealt with more fully in the discussion of product and process layouts further on in this chapter.

Ultimate Purpose. The ultimate purpose of layout is to improve profits. The contribution which it can make toward this objective is in finding the best route for moving materials from receiving to shipping, through many intervening operations, in the shortest time and distance. Since the best plans for the layout of processes have a direct effect on costs, they correspondingly affect profits.

Flexibility. New attention is being given to flexibility of layout by planning engineers. One reason for this emphasis on flexibility is the increasing problem of machine obsolescence, leading to the need for new machines and a rearrangement of equipment to maintain balanced operations and to prevent bottlenecks. Another reason, and probably more important, is the constant possibility of a shift in products, materials and processes. An important change in any one of these three may seriously affect the current layout. The purpose is to accomplish necessary layout changes with the least cost in time and expense. Although flexibility is not so important in continuous process industries like paper-making and petroleum refining, it may be looked upon as almost mandatory in many others.

The Air Force has a large installation at Oklahoma City where it reconditions planes and installs improved equipment, referred to as "modification." Various plane models require different arrangements of machinery and equipment for the most expeditious handling of the work. About half the building is occupied by a line of planes, while the other half houses the machines for doing the work. To obtain flexibility of machine arrangement, many pieces of equipment are placed on heavy skids so that they can be moved quickly in response to any change in layout. Designed for single-story buildings, with heavy concrete foundations, this plan represents the ultimate in flexibility. The greater the flexibility of layout, the greater the opportunity to adapt operations to changes in methods, machines or material handling.

---

[4] The relation between layout and material handling is considered in detail in the next chapter.

Basic considerations

The *nature of the business or industry* has a direct effect on layout. If the business is classified as heavy production or warehousing, a single-story structure with firm foundations will naturally be preferred. This would apply to steel production or steel warehousing. If it is a comparatively light industry, such as knitting of seamless hosiery or office work, the building can be of light construction.

Fire and other hazards will also control both the type of structure and the layout. The building may be fireproof or fire-resistant in its entirety, or for certain departments. Numerous hazards such as fire, fumes and acids, may even demand separate buildings for the affected operations.

Multiple buildings may be demanded either because of specific hazards or because of the nature of the business. If some operations require heavier building construction than others, it may be both convenient and cheaper to plan for separate structures.

Single- or multiple-story buildings must also be fitted to the nature of the business. For heavy industry, the decision is easy: one story. For those concerns whose operations and materials are relatively light in weight, material-handling needs may guide decisions about the number of stories. Since material handling is always expensive, whether by machine or by hand, any possible handling by gravity is a prospect for reducing costs. The major operations of a mattress factory, for example, may be divided into five or six departments, each of which may be located on a separate floor, with material handling largely performed by gravity. The top floor may be used for materials, where bales are opened and the contents run through pickers from which they fall to the floor below, to felting machines. The rolls of felt are dropped or slid to the next lower floor for filling the mattresses, which again are dropped to the next floor for finishing. The final gravity handling takes the finished product to the ground floor for baling or boxing, and shipping.

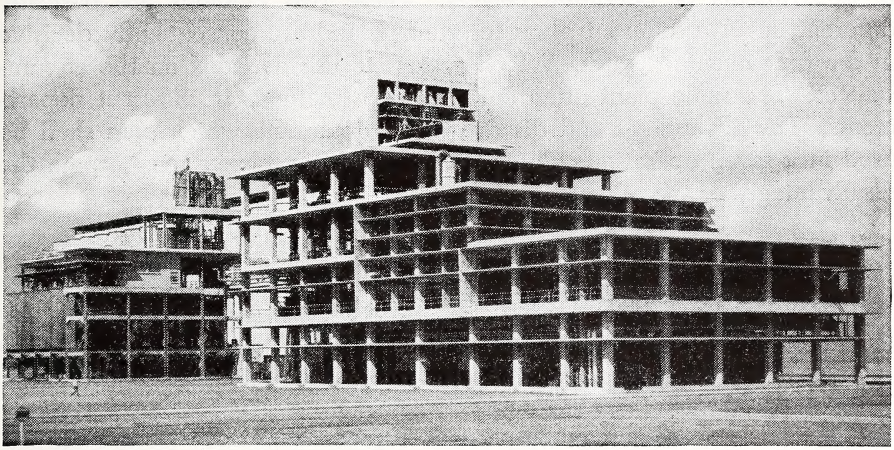
There are many lines of business and industry where multistory operations provide cheap material handling by gravity. Few can drop their materials and finished products from one floor to another through holes made for the purpose, but many can use various kinds of chutes or gravity-fed handling. In some cases where there is a tendency to high-speed gravity handling, spiral chutes or baffles can be used to reduce speeds. Occasionally, the handling of materials can be accomplished to advantage by building on a grade. When such a site is available, direct entrance can be obtained on two or three ground levels.

Location of the plant site may determine the number of operating floors. Expensive locations within large cities necessarily lead to multistory buildings. The added investment under such circumstances is not so vital if the type of business lends itself to multistory operation.

Special building types have a direct effect on plant layout. Most common

FIGURE 12.1

Plant Constructed without Walls



Courtesy: Corn Products Refining Company

is the windowless plant or office building which is independent of natural light and outside temperature conditions. With artificial lighting and controlled temperatures, layout is less restricted. Due to the hazardous nature of the business, and to minimize damage in event of enemy air attack, an industrial plant at Corpus Christi, Texas (Figure 12.1) was built in part without walls. Climate is naturally a factor in such construction, and a plant of this type sets up certain restrictions on layout.

A third type of plant or warehouse goes underground in a natural or artificial cave. This idea started in Germany several years prior to World War II for protection against enemy bomb attack. Some of Sweden's basic industries went underground during the war, for the same purpose, and have remained there. Sweden reports that her underground plants are not only safer in time of war, but have the advantage of being impervious to weather conditions, as well as not requiring outside maintenance. Temperatures are relatively stable and the absence of drafts has reduced illness among the workers. It is reported also that, although original underground construction costs are about 15 per cent higher than surface building, underground operation over a thirty-year period will be about 10 per cent cheaper. Our Army Corps of Engineers started studying the advantages of underground operations at the end of World War II, including surveys in England, Japan, Germany and Sweden.

Product and process layouts

The two chief *methods of manufacturing* also have a marked effect on plant layout. The better known *product method* places the various machines in their proper sequence, connecting them in different ways for handling materials and parts between operations, until a complete production line is established. The *process method,* on the other hand, groups similar machines in departments or operation centers. These two methods are basically different, involve different plans for control, and are consequently decisive in the fundamental layout. Which system to use depends on the circumstances. The same plant often employs both methods in different departments. The advantages and disadvantages determine which plan shall be used in a given operation. The advantages of one plan often become the disadvantages of the other.

Advantages of product layout:

1. Material-handling costs are lower because of production-line operation.
2. Unit costs of production are lower where large quantities are manufactured.
3. Inspection is easier than under the process method.
4. There is a smaller amount of work-in-process, thus reducing the investment.
5. Unit-production times are lower.
6. Less floor space is required per unit of production.
7. Closer and simpler production control is permitted, thus lowering costs.
8. Better opportunities are provided for group incentive-wage plans.

Advantages of process layout:

1. Greater flexibility in production is permitted; product changes under the product method require new setups.
2. Lower investment in equipment is required.
3. Better supervision by specialists is obtained.
4. Better control of inspection is possible.
5. Incentive wage rates can be put on an individual basis, which is superior to the group plan.
6. Machine breakdowns are easier to handle because of duplicate machines for each process.
7. Absentee problems are easier to handle because of similar skills used in each of the processes.

Product layout is adapted to the manufacture of large volumes of one or a few products. It also permits closer time studies, and therefore better standard times can be arrived at. It is easier to maintain a balance of machines and personnel if the system is properly set up. Machines and personnel are in proper balance when production proceeds with a smooth flow. When a minimum of inspection is required, it is performed more easily on a product layout. The product plan is most efficient when a minimum number of changes in machine setups are necessary. Finally, the product plan reduces material handling to a minimum.

On the other hand, *process layout* is necessary to take care of special orders and style products, where frequent changes are necessary. The process plan often requires more inspections than the product plan. Balance of machines and personnel is more difficult to achieve under this method, and hence utilization of both is lower — the natural consequence of specialty or job work. For the same reason, standard times are more difficult to establish. Flexibility of operations is one of the virtues of the process layout. The machines used under this plan are always available for more than one operation. Finally, a machine breakdown, or employee absence, does not necessarily hold up the flow of production, as is the case under the product layout.

Preliminaries to planning the layout

A certain amount of detailed information, which can be broken down under six categories, is needed before the actual job of laying out a plant can begin. In large part, this preliminary information is also needed in laying out a large warehouse, office building or store. We are primarily interested in plant layout because it includes all the factors influencing layout in other types of business. Fundamental to any planning is a knowledge of physical inventories of building, equipment and transportation facilities. The details obtained from these inventories are used in conjunction with a complete operation analysis to make the flow process chart and the flow diagram.

Building inventory starts with the blueprints, which show floor sizes, locations of partitions, columns, doors, aisles, ramps, elevators, and all other fixed limitations to operational layouts. Many other details, such as floor- and elevator-load limits, ceiling and clearance heights, and the location of service facilities are vital to a workable finished plan. Service facilities include such items as electric and gas lines, heating, lighting and ventilating equipment.

Equipment inventory covers all relevant information concerning machines and equipment, including their location, size, weight, and a brief description of how they will be used.

Transportation inventory includes items used for internal transportation or material handling. Everything from tote boxes to traveling cranes should be on this list, not only by descriptive names, but also by capacity, weight, use or uses, type of power required, and finally, it should be noted whether the item is fixed or movable.

Operation analysis is the heart of the problem to be solved. How the product is to be made, or the service performed, is the guiding factor in layout. For balancing production-line operations it is vital to know the total time for an operational cycle. The cycle is also basic for building the flow process chart. This analysis must refer to any special considerations in the process, such as lighting, power, floor strength required, types and sources of power, and special installations to minimize vibration and noise.

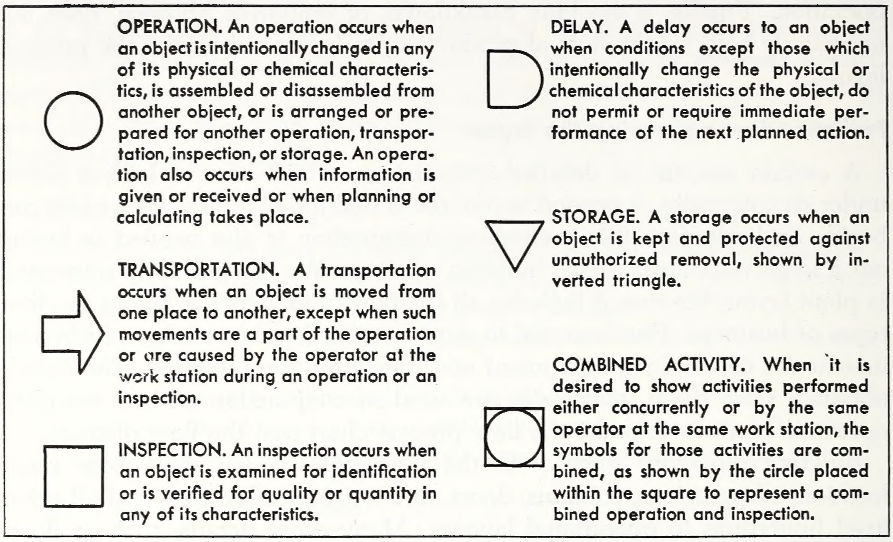
Process charts are used in the planning stage to represent graphically the movement of materials and the sequence of operations. Symbols for the construction of these charts have been standardized by the American Society of Mechanical Engineers.[5] Figure 12.2 shows the conventional symbols for

---

[5] See *Operation and Flow Process Charts* (New York: American Society of Mechanical Engineers, 1947).

FIGURE 12.2

Symbols for Process Charts



OPERATION. An operation occurs when an object is intentionally changed in any of its physical or chemical characteristics, is assembled or disassembled from another object, or is arranged or prepared for another operation, transportation, inspection, or storage. An operation also occurs when information is given or received or when planning or calculating takes place.

TRANSPORTATION. A transportation occurs when an object is moved from one place to another, except when such movements are a part of the operation or are caused by the operator at the work station during an operation or an inspection.

INSPECTION. An inspection occurs when an object is examined for identification or is verified for quality or quantity in any of its characteristics.

DELAY. A delay occurs to an object when conditions except those which intentionally change the physical or chemical characteristics of the object, do not permit or require immediate performance of the next planned action.

STORAGE. A storage occurs when an object is kept and protected against unauthorized removal, shown by inverted triangle.

COMBINED ACTIVITY. When it is desired to show activities performed either concurrently or by the same operator at the same work station, the symbols for those activities are combined, as shown by the circle placed within the square to represent a combined operation and inspection.

Figures 12.2–4 extracted from ASME Standard Operation and Flow Process Charts, 1947, with the permission of the publisher, the American Society of Mechanical Engineers, 29 West 39th Street, New York 18, N. Y.

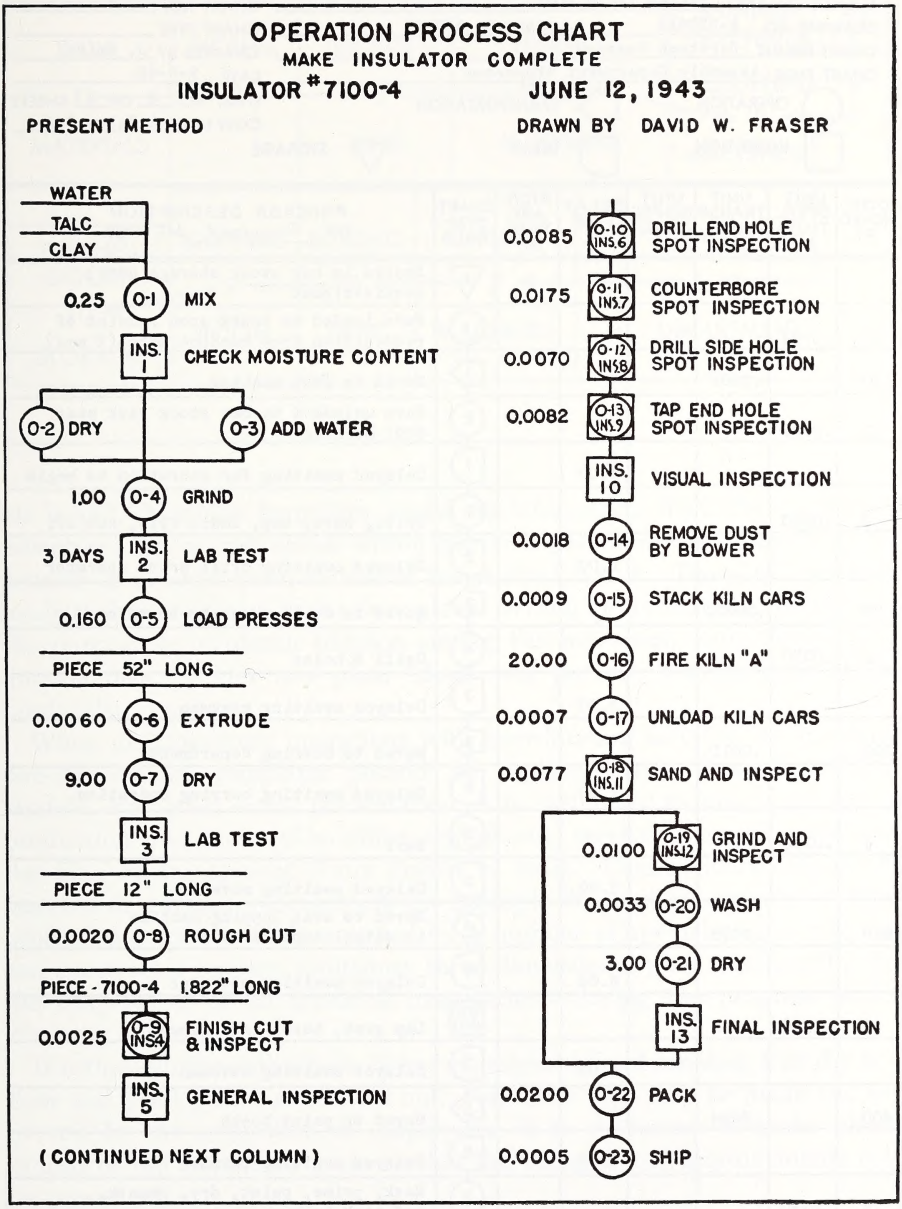
operations, transportations, inspections, delays and storages. The ASME distinguishes two types of process chart. The *operation* process chart is a graphic representation of the points at which materials are introduced into the process, and of the sequence of inspections and all operations except those involved in material handling. This is illustrated in Figure 12.3. The *flow* process chart focuses on sequence. It differs from the operation process chart by depicting transportations, delays and storages as well as inspections and operations. A typical flow process chart is shown in Figure 12.4. The great virtue of process charts is that in reducing a process to a set of static symbols, they suggest ways in which operations can be combined or rearranged or altogether eliminated in the interests of saving time or space.

The *flow diagram* is similar in purpose to the process chart. However, instead of representing operations symbolically, it is more in the nature of a map or a partial floor plan of operations. (See Figure 12.5.) The flow diagram lays special emphasis on the amount of back-tracking that occurs in any given sequence of operations. It is relatively simple to construct a flow diagram for a single-floor operation; in multistory buildings, isometric drawings are required to show such items as elevators, chutes and service facilities.

The layout plan

Having secured his preliminary information, the engineer is ready to start

FIGURE 12.3


OPERATION PROCESS CHART
MAKE INSULATOR COMPLETE
INSULATOR #7100-4
JUNE 12, 1943
PRESENT METHOD
DRAWN BY DAVID W. FRASER
WATER
TALC
CLAY
0.25
O-1
MIX
INS. 1
CHECK MOISTURE CONTENT
O-2
DRY
O-3
ADD WATER
1.00
O-4
GRIND
3 DAYS
INS. 2
LAB TEST
0.160
O-5
LOAD PRESSES
PIECE 52" LONG
0.0060
O-6
EXTRUDE
9.00
O-7
DRY
INS. 3
LAB TEST
PIECE 12" LONG
0.0020
O-8
ROUGH CUT
PIECE - 7100-4 1.822" LONG
0.0025
O-9 INS.4
FINISH CUT & INSPECT
INS. 5
GENERAL INSPECTION
(CONTINUED NEXT COLUMN)
0.0085
O-10 INS.6
DRILL END HOLE SPOT INSPECTION
0.0175
O-11 INS.7
COUNTERBORE SPOT INSPECTION
0.0070
O-12 INS.8
DRILL SIDE HOLE SPOT INSPECTION
0.0082
O-13 INS.9
TAP END HOLE SPOT INSPECTION
INS. 10
VISUAL INSPECTION
0.0018
O-14
REMOVE DUST BY BLOWER
0.0009
O-15
STACK KILN CARS
20.00
O-16
FIRE KILN "A"
0.0007
O-17
UNLOAD KILN CARS
0.0077
O-18 INS.11
SAND AND INSPECT
0.0100
O-19 INS.12
GRIND AND INSPECT
0.0033
O-20
WASH
3.00
O-21
DRY
INS. 13
FINAL INSPECTION
0.0200
O-22
PACK
0.0005
O-23
SHIP

Courtesy: American Society of Mechanical Engineers

FIGURE 12.4

FLOW PROCESS CHART

SUBJECT CHARTED RELIEF VALVE BODY
DRAWING NO. A-520612 PART NO. 16150
CHART BEGINS Barstock Storage
CHART ENDS Assembly Department Storeroom
CHART NO. 1021
CHART TYPE
CHARTED BY J. Smith
DATE 9-9-43
SHEET NO. 1 OF 1 SHEETS
COST UNIT 1 Valve Body

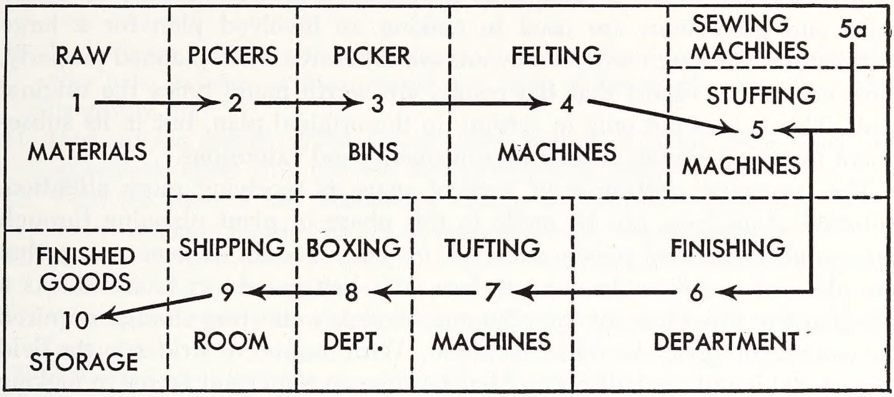
◯ OPERATION ⇨ TRANSPORTATION
□ INSPECTION D DELAY ▽ STORAGE

DIST. MOVED FT.	UNIT OPER. TIME *Hr.*	UNIT TRANSP. TIME *Hr.*	UNIT INSPEC. TIME *Hr.*	DELAY TIME *Hr.*	STORAGE TIME *Hr.*	CHART SYMBOLS	PROCESS DESCRIPTION OF *Proposed* METHOD
						▽ 1	Stored in bar stock storage until requisitioned
10	.0002					◯ 1	Bars loaded on truck upon receipt of requisition from machine shop (2 men)
210		.0002				⇨ 1	Moved to #301 machine
10	.0002					◯ 2	Bars unloaded to bar stock rack near #301 machine
				4.00		D 1	Delayed awaiting for operation to begin
8	.0550					◯ 3	Drill, bore, tap, seat, file, cut off
				2.00		D 2	Delayed awaiting drill press operator
20		.00002				⇨ 2	Moved to drill press by operator
8	.0350					◯ 4	Drill 8 holes
				2.00		D 3	Delayed awaiting moveman
300		.0011				⇨ 3	Moved to burring department
				1.50		D 4	Delayed awaiting burring operation
6	.0100					◯ 5	Burr
				2.00		D 5	Delayed awaiting moveman
550		.0005				⇨ 4	Moved to seat lapping machine in detail department
				6.00		D 6	Delayed awaiting operator
6	.1700					◯□ O-6 INS-1	Lap seat, test, and inspect
				2.00		D 7	Delayed awaiting moveman
400		.0004				⇨ 5	Moved to paint booth
				6.00		D 8	Delayed awaiting painter
15	.0380					◯ 7	Mask, prime, paint, dry, unmask, and pack in box
425						⇨ 6	Sent by conveyor to assembly department storeroom
					60.0	▽ 2	Stored until requisitioned

Courtesy: American Society of Mechanical Engineers

FIGURE 12.5

Flow Diagram of a Mattress Factory



his layout. Machine templates, based on information from the equipment inventory, are moved about within the floor-plan drawings, based on the process or product plan, to obtain the desired layout. Templates must be made to the same scale as the floor plans. Within either manufacturing plan, the purpose is to obtain balance among the machines, with smooth production flow. Under any plan, "flow" will prevent backtracking of the production processes.

When multiple-story operations with coordinating services are involved, two-dimensional templates should be replaced with three-dimensional models. For good visual presentation, it is customary to mount models of production and material-handling equipment, service lines, elevators and the like, on transparent floors drawn to scale. These "floors" should be inserted in a frame, representing the multiple floors of the structure. With professional scale models supplied by a number of specialty concerns, one can construct a realistic multistory three-dimensional plan which will enlist the cooperation of all levels of management during the progress of the planning operation.

It is through the enthusiasm of top management and foremen that the best floor and plant plans are worked out. Plan after plan may be made and improved by the suggestion of employees. It is customary to make photographs of the completed plans so that the changes and improvements may be preserved.

Color codes are used to indicate various types of service facilities, such as steam and gas lines, and for many other purposes. When photography is used extensively in reproducing multistory plans which include color codes, color photography is advisable. Colors are also useful in picturing process and product methods of manufacturing.

Conclusions

Layout is not nearly so simple as it appears from this discussion. Many skills and professions are used in making an involved plan for a large installation. Although intricate layouts are expensive when planned properly, most companies report that the results are worth many times the original cost. This is true not only in setting up the original plan, but in its subsequent use for planning further improvements and extensions.

The maximum utilization of vertical space is receiving more attention. Substantial progress can be made in this phase of plant planning through the use of transparent plastic materials for floor models. It is necessary that the plans of one floor do not interfere with between-floors facilities. As a safeguard in this phase of the planning, models indicating storage required for work-in-progress should be included. With the recent strides in the field of material handling, palletizing [6] has become an important factor in making floor plans.

Although this discussion has hit only the high points of the many factors involved in plant and warehouse planning, it indicates some of the problems involved in a well-planned layout. Because of the many modern improvements in machines, facilities and service centers, and the number of dangers which must be guarded against in advance, it is clear that we can no longer make satisfactory floor plans for our factories and other structures by waiting until a building is completed and then arranging the inside requirements on the basis of production know-how.

QUESTIONS

1. Where would you inquire to learn about the advantages and disadvantages of prospective business locations? Name some information sources of which you would be skeptical.
2. To what extent should tax exemption, low labor costs and a free building site be given consideration in relocating a business?
3. What factors did General Motors consider in deciding whether to locate an iron foundry at Defiance or Tiffin, Ohio?
4. Under what six general categories did the eighty-three factors fall which landed a DuPont plant at Kingston, N.C.?
5. What is the acid test in making the final decision as to the best location for any type of business?
6. Should the raw-material or finished-goods market receive weightier consideration in plant location?
7. What are some of the advantages that accrue from finding the desired labor supply in adequate amount in a proposed location?

---

[6] The pallet is a small platform used to transport materials. Frequently it is made to a standard size and used for storing raw materials or work-in-process at various production centers. An extended discussion of the pallet and its uses will be found in Chapter 13.

8. What effect will the development of atomic power have on industrial plant locations?
9. To what extent is it advantageous to locate sales or industrial concerns close to others with the same or allied interests? Does the type of business affect your decision?
10. If the moist New England climate was so favorable to the textile industries, why have so many of them moved into parts of the South where it is comparatively dry?
11. How can the attitude of local government, outside of its tax policy, have any appreciable effect on a business located within its limits?
12. What are some of the outstanding reasons for business relocations? Is the answer different if it applies to one plant of a multiplant concern?
13. Has the internal plant layout any relation to its general location or specific plant site? In what respects are the two factors interrelated?
14. What is the importance of material handling to retail, wholesale and industrial business?
15. How can layout flexibility be obtained? Illustrate its advantages.
16. Discuss some of the basic problems which must be considered in industrial plant layout.
17. What advantages accrue from business buildings with solid walls? What are the advantages of underground buildings?
18. Explain the distinction between process and product layouts for industry. What factors determine selection of the one or the other?
19. What are the six preliminary considerations necessary to do a scientific job of layout?
20. How does a well-planned three-dimensional layout stimulate manager and worker interest in making suggestions?

CASE PROBLEM

THE LOGUE-WEAVER PAPER COMPANY

The Logue-Weaver Paper Company, located in Holyoke, Massachusetts, is a combination of two old manufacturers of high-grade rag papers. Both concerns started, in a small way, in the late seventies, always operating as keen rivals until their consolidation in 1910. The two mills are located within a quarter mile of each other, and both obtain their power from the same stream. The earlier generations of this two-family concern were decidedly conservative. A few years after the consolidation, one of the plants was enlarged by about 50 per cent, which was the only change in seventy-five years. It was at that time the company divided production of their paper varieties, with the idea of reducing costs through specialization.

The present officers include two representatives of the Logues, who are cousins, and the three Weaver brothers. For about six months, the group has been discussing the advisability of moving the concern south, or at least starting a branch plant in that section, Florida preferred. The idea originated with the Weaver brothers and is opposed by the two Logues, who are of a somewhat earlier vintage than the Weavers. Cyrus Logue, the oldest of the group, feels that the Weavers have developed their interest in Florida chiefly because of their winter vacations in that state. The Weaver brothers, on the other hand, contend that volume and profits would be better if they expanded their line into the craft and specialty lines in the South. They also argue in favor of the possibilities offered by the large Florida supply of slash pine and its rapidly expanding electric power facilities. Movement of the paper industry as a whole to that state was also offered as a factor which must have some significance for them.

To soften the shock of the move, the Weavers have suggested that the company establish the Florida plant as a branch whose product would not conflict with their present line while the new business was being built to a point where it might be feasible to sell the Massachusetts plants. Owing to the age of the concern and its conservative financial management, there would be no considerable problem in obtaining the necessary cash and credit for the move, even if the old plants were retained.

Finally it was decided to employ an industrial engineer to make a survey of a west Florida coast site proposed by the Weavers. The engineer summarized the following data:

1. *Land.* Five acres of the proposed site can be purchased for $2500. This compares with the suggested market value of $5000 for the two acres of land occupied by the present mill sites.

2. *Building.* To construct a paper mill according to the plans submitted, with double the capacity of the two small mills, will cost approximately $120,000. The market value of the two Holyoke mills, including land and buildings, is about $65,000. This figure does not include machinery and equipment.

3. *Machinery.* This item should scarcely be considered since the equipment necessary for the new location would cost about the same in Massachusetts or Florida. However, the paper-machinery house estimates the cost of machinery listed by the company's officers at approximately $25,000. The same agency estimates the value of the present machines and equipment in the Holyoke mills at $60,000.

4. *Transportation.* Railroad, truck and air transportation are about the same in both places. Truck transportation is likely to be somewhat cheaper per mile in Florida, but the distances are greater to both raw materials and finished-goods markets. The Florida location has a decided advantage for water transportation, since the site has a fair harbor on the Gulf.

5. *Taxes.* Commercial property and business taxes are about 10 per cent higher for the same valuation in the Florida location. Because of the $5000 homestead exemption, taxes on employees' homes will average about 10 per cent of the Holyoke charges, assuming that the market value of their homes will approximate $9500. Assessments are about 60 per cent of the market values.

6. *Raw Materials.* For the paper products contemplated, the Florida location offers excellent possibilities. If the company wishes to start a program of raising its own pulp wood, large tracts can be bought for the purpose at about $25 per acre. Such available timber land is about twenty-five miles inland.

7. *Finished-Products Market.* These markets are not so favorably located as in the New England territory, but the southeastern section, and Florida in particular, is growing rapidly. Certain paper specialty items can be shipped at rates which will permit reasonable competition within five hundred miles.

8. *Living Conditions.* This factor will be a more or less personal matter with

the present employees. Some may consider the move desirable. This should be true of a nucleus necessary to start operations. The Florida climate offers possibilities not found in New England, and vice versa.

9. *Labor.* There is a sufficient supply of both semiskilled and unskilled labor in the vicinity of the proposed site. Skilled paper-mill workers are available in reasonable supply, owing to the proximity of established mills in the state, especially on the west coast at Panama City.

10. *Wages.* On the average, wages are slightly lower, but this differential will gradually disappear as organized labor becomes stronger in the South. The local unions covering this type of business are reported to be reasonable in their dealings with management at the present time. This industry is fairly well organized.

PROBLEM. Would you advise the Logue-Weaver Paper Company to establish a new mill on the west coast of Florida at the proposed site? If so, should the company retain its present holdings, or make a clean change of location? To what extent have you considered the difficulty of building sales in its new line in the southern territory? It is reported that there is already fairly stiff competition producing craft papers in that region. Would you advise a canvass of the employees of the Logue-Weaver Company as to the contemplated change before making a decision, and why? If you are undecided about any change, what additional information would you require before making up your mind?

CHAPTER 13 Material Handling

Not until management became convinced that the handling of materials had a direct relation to productivity, and that the production processes were far in advance of handling methods, was there any general effort to improve the techniques of this activity. Even before management's recognition of the importance of material handling to production, the acute labor shortage and rapidly rising wage scales caused by World War I forced attention to improving the movement of materials. With the business recession that followed, interest in this subject lost its vigor until the longer span of World War II forced the government to speed the movement of personnel and the huge piles of materials at the ports of embarkation. Crews of analysts were assigned to make scientific surveys of the problem. Their unexpected results stirred the interests of business, and the quest for speed and savings through better handling was on its way.

Stepped-up demand caused by the war brought many problems to management, especially in the field of production. Farsighted executives pioneered studies for better and cheaper methods for handling materials until the subject became a recognized phase of engineering in many lines of business and industry. The tremendous amount of book and periodical literature appearing on this subject in the decade following 1940 is sufficient evidence of its current importance. A recent annual exposition of material-handling equipment was a five-day affair that brought more than 25,000 business executives to Chicago's International Amphitheatre. Eight acres of space displayed ten million dollars' worth of new equipment, made by more than 200 concerns.

The growing popularity of material-handling literature and the annual expositions reflect management's consciousness of the increasing ratio of material-handling costs to total production costs. This subject is particularly interesting to industry; its techniques and progress will be discussed chiefly from the industrial standpoint. However, handling is a considerable factor of total costs in many lines of business, and the principles here considered are applicable to numerous activities involving the movement of light and heavy objects and materials of all kinds. In department and other retail stores, wholesale and warehouse establishments, and in many service businesses, material handling is being constantly improved, by the application of the procedures discussed in this chapter, to obtain better and quicker service, at reduced unit expense.

Cost of handling materials

In the process of economizing in the use of indirect labor (sometimes referred to as unproductive labor) management becomes impressed with the opportunities for saving in material handling. Obviously, the final responsibility for analyzing the values and costs of material handling should not rest with the foremen, who are in direct charge of the handling operations, but should be assumed by the highest levels of management. A pertinent fact concerning the handling of materials is that *it adds nothing to the value of the product* as far as the producer is concerned. In spite of this fact, material handling remained for a long time outside the active interest of upper management. It is still the practice in some job shops, for example, for machinists to charge direct labor time for bringing materials to their benches. Such practices not only overload direct labor costs, but they make it practically impossible to determine true material-handling costs.

The comment is rather general among management specialists that the techniques of material handling have fallen far behind those of production, thus offering a fertile field for the material-handling engineer. Case studies indicate that on the average about fifty tons of materials are handled for every ton of finished product. It is estimated that material handling absorbs almost 25 per cent of total production costs, and well over 50 per cent of overhead costs. In a steel mill with one thousand or more workers, up to 80 per cent are assigned to handling materials.

Figure 13.1 shows a breakdown of production costs, including the percentage required for handling materials. One of the industrial publications boils down the material-handling lessons to be learned from the breakdown of production costs in this way:

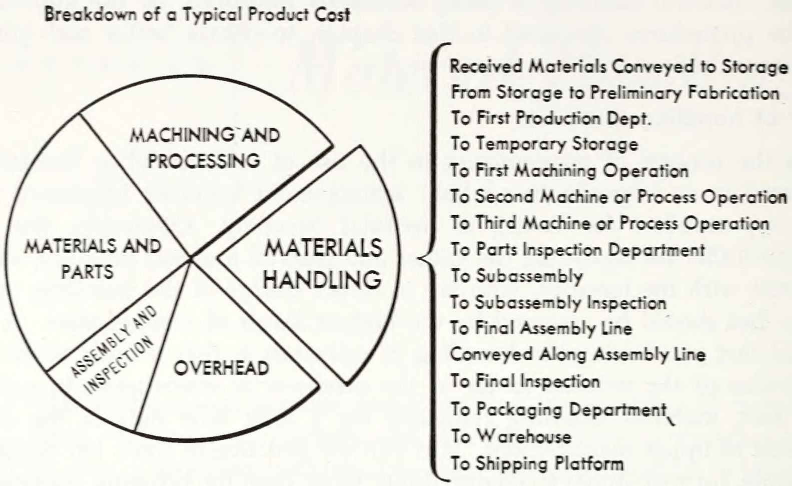
> Total wages in manufacturing in 1948 were somewhere around $35 billion. Let's be conservative and say that only 25 per cent went for handling. That's close to $9 billion. Again let's be conservative and say industry could cut its handling costs 25 per cent. Net result would be a saving to industry of more than $2 billion.
>
> But that is not all. There are other ways in which industry benefits from increased use of materials. Here are just a few:
>
> Steady flow of production. . . .
> Shorter manufacturing cycles. . . .
> Smaller inventories. . . .
> Quicker deliveries. . . .
> Better utilization of space. . . .
> Better working conditions. . . .[1]

---

[1] "Better Materials Handling for Cutting Costs and Increasing Productivity," *Factory Management and Maintenance,* Vol. 107 (January 1949), p. 65.

FIGURE 13.1

Break-down of Material-Handling Costs



Redrawn from *Mill and Factory* with permission of the publishers

The significance of material handling is made clear when one realizes that it begins with the raw materials and ends when the finished goods are in the hands of the consumer. But any handling program, to justify itself, must contribute to the effectiveness of production operations without increasing costs to the consumer. One company, with a remarkable lack of study or planning, installed an expensive and elaborate conveyor system only to find that it not only did not improve productive efficiency, but that it required six semiskilled operators whereas the previous method required only two unskilled laborers. The fact that material-handling equipment is sometimes an intricate and costly tool of management suggests the desirability of a complete economic and operations study prior to its purchase.

Advantages of proper material handling

A properly integrated material-handling system usually includes the following advantages:

1. Lowers unit-handling costs
2. Reduces inventories
3. Speeds and improves inventory taking
4. Shortens production cycles
5. Makes indirect labor more efficient
6. Lowers accident records
7. Reduces damage to materials
8. Promotes utilization of floor space
9. Levels the flow of production
10. Improves customer deliveries

11. Reduces demurrage charges
12. Reduces worker fatigue

Elaboration of these advantages will be made in subsequent discussions. However, it is pertinent to point out that many possible improvements will be lost to production processes unless the accepted techniques of material handling are fully utilized. Maximum utilization of machines dovetails production with material-handling schedules to produce minimum internal transportation costs.

A quotation from an economics text, published before material handling was given any scientific attention, illustrates the point. "If the annual expenses for interest and replacement of fixed capital are $300,000 in any business, and the product value is $1,000,000, then the cost of the fixed capital will be thirty cents for each dollar of product. Now if the output of the business be increased to $1,500,000 by merely utilizing the machinery to the greatest degree possible, then the cost of the fixed capital will be only twenty cents." [2] This is exactly what properly engineered material handling should accomplish — the maximum utilization of productive facilities. But this will not come about until the principles and techniques of material handling have been worked out as thoroughly as have been the principles and techniques for direct production processes.

Material-Handling Equipment

Trucks

In general, there are two elementary types of material-handling equipment — hand operated and machine powered. The *hand truck* is the most universally used, and under certain circumstances it is often the most economical to operate. The stevedore hand truck has two wheels whereas the hand-platform type has four to six wheels. There appear to be about twenty-two wheel combinations in use on the hand trucks, including rigid, swivel and balancing wheels.[3]

The *machine truck* is powered by gasoline, electric storage batteries or gasoline-electric units. Of the machine-powered units, the fork truck is most used, customarily for moving pallet loads, as will be explained later. Figure 13.2 illustrates two simple types of truck. The power fork truck in the illustration is moving merchandise on a pallet. The choice of trucks to be used on any given operation is judged by the same criteria influencing the use of any material-handling equipment, namely, that which gives the lowest cost per unit of materials handled or that which handles the materials

---

[2] Charles J. Bullock, *Introduction to the Study of Economics* (New York: Silver Burdett Company, 1900), pp. 173–174.

[3] These twenty-two wheel arrangements for hand trucks are illustrated in a brochure by Harry E. Stocker on *Materials Handling* (International Correspondence Schools, 1952), p. 8.

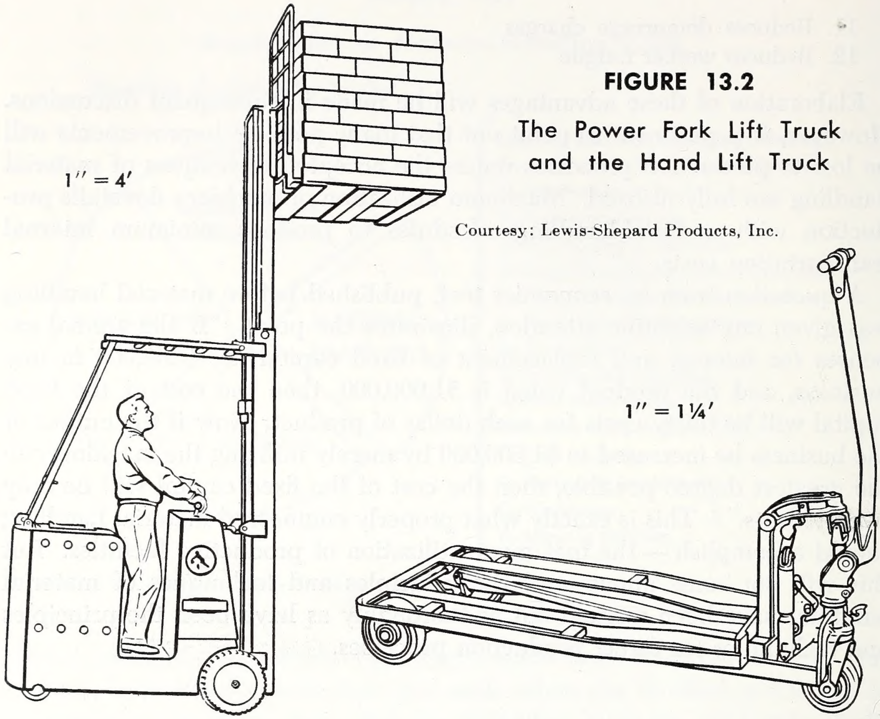


FIGURE 13.2
The Power Fork Lift Truck and the Hand Lift Truck

Courtesy: Lewis-Shepard Products, Inc.

in the fastest time. The decision must be based on the facts in the case under consideration.

The Lift Truck. The earliest progenitor of today's powerful lift truck came into use in 1887. It was manually operated, its small platform lifting relatively light weights about three feet by means of a winch. By 1904, hand-operated portable elevators with revolving bases were used to pile material loads of three hundred pounds about six feet high, chiefly in warehouse storing. Two years later, the Pennsylvania Railroad added power drives to its four-wheel baggage trucks. The first lifting device capable of raising substantial loads came in 1915, and the next step was a truck capable of both vertical and horizontal movements. The first machine-powered fork truck, built in 1919, used a winch arrangement to pull and hold its load in place. It lifted its load straight up, but not high. A real improvement in design came in 1924 when the battery was placed in the rear to balance the front load. It permitted safer center operation and a shorter wheel base. The 1933 truck combined hydraulic lifting, center control, front-wheel drive and rear-wheel steering.

This fifty-year development of the primary material-handling tool is insignificant compared to that of the past ten years. Figure 13.3 illustrates the world's largest lift truck (1951) which weighs 84,000 pounds, and carries 80,000 pounds of steel coils. It is reported that this truck carries twice the load formerly carried. What the future holds for carrying capacities of fork trucks can be estimated from the enormous strides forward of the past decade. But not all fork trucks are out for heavyweight championships. The increasing number of uses for them in various phases of production and hauling is actually their chief bid for adoption. For example, the fork truck is rapidly acquiring an important place in foundry operations. By pouring molten metal into a series of flasks, it has cut the time by 50 per cent, with the truck driver as the only operator. Previously, mechanical pouring was done from a much slower monorail ladle which required two operators. The fork-lift dumper is also being used for many similar operations. The box container is left by the truck at the place where its load is to be received. Later, the fork lift picks up the loaded container and takes it to its destination where it is dumped automatically by special equipment attached to the lift. The hydraulic-bellows type of lift is one answer for situations requiring low clearance or close quarters when the truck is not in use. The bellows lift rises directly from the body of the truck, to which it can be completely collapsed when not in use. This device allows the truck to be operated inside freight cars and other places with low clearance.

Pallets and unit loads

The pallet is illustrated in Figure 13.4. As can be seen from the illustration, the space between the top and bottom sides of the pallet provides an

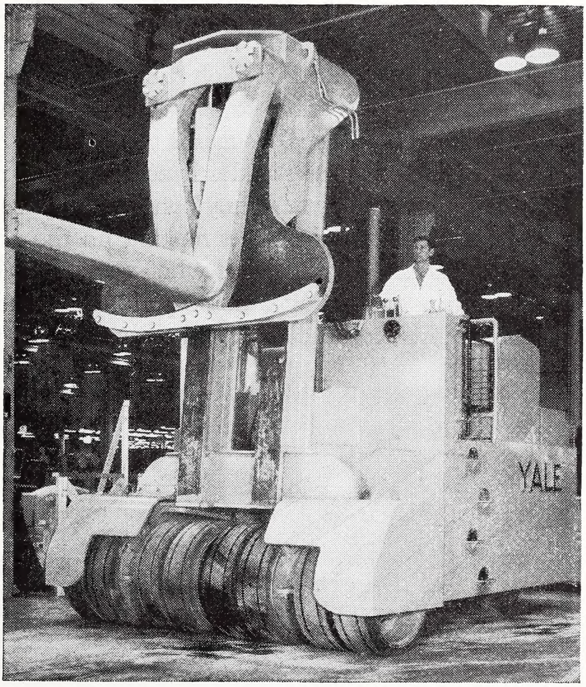


FIGURE 13.3

World's Largest Lift Truck in 1951

Courtesy: Yale & Towne Mfg. Co:

entrance for the truck's forks, on which the pallet is lifted and carried to its destination. The pallet saves the time of the truck and of its operator, who avoids having to pile the load directly on the truck's forks. This time-saving feature was the original purpose of the pallet.

Subsequent development of the pallet has greatly enlarged its usefulness. In the first place, it is now almost universally related to *unit loads*. A unit load is one that has proved most convenient from the standpoint of size and weight for hauling, storing and shipping purposes. The development of palletizing in unit loads has led to such secondary advantages as easier inventory taking, improved worker safety and reduced damage to materials. Although many products still pass around plants and commercial establishments in small packages, increasing attention is being given to transportation economies resulting from moving large unit loads on pallets.

If the pallet is to be used effectively, consideration must be given to its size, construction and strength. Skids were used for transporting and storage long before the development of pallets and fork trucks. There were several disadvantages to skids. For one thing, the legs of the skids damage many materials. Furthermore, skids tend to be more costly than pallets. Because they are higher than pallets, a certain amount of space is inevitably lost. A final drawback to the increased use of skids was the failure in practice to standardize their sizes. Those professionally interested are determined that this mistake shall not be repeated with pallets. The dimensions most often suggested for pallet bases are 48 inches by 40 inches because bases of this size will fit into freight cars and trailer trucks without need for expensive bracing during transit. However, there is a large demand for other sizes, so that the final suggestion is for three or four standard sizes capable of taking care of most uses. If such standardization could find general acceptance, it would be possible to establish pallet pools in various parts of the country, from which local concerns could borrow pallets as needed.

If pallet bases can be standardized in a small number of sizes, the height is relatively unimportant. Many concerns require pallet heights fitted to the size and weight of the objects making up the palletized unit loads. These requirements can be numerous when applied to external and internal plant transportation and storage. Some pallets are made with collapsible sides of various heights; in other cases, the material on the pallet forms the pallet sides.

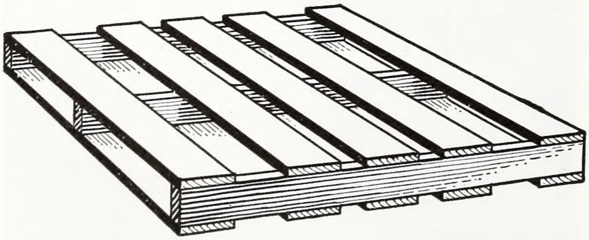


FIGURE 13.4

The Pallet

Because high-cost pallets have to be returned to their owners, and because this involves time and expense, continuous experimentation has been going on to find ways to construct cheaper pallets with adequate strength for many uses. The latest result is the so-called "paper" pallet, which several large concerns report having used successfully. The standard-sized pallet made of compressed paper weighs about six pounds, which is only 10 per cent of the weight of a wooden pallet of the same size. One objection to the paper pallet is that it cannot be hoisted on board ships by ordinary slings without damage to its sides. Another objection is that it is weakened by moisture, a feature which is being overcome by the use of moisture-resistant chemicals.

The Navy has issued a set of recommendations on pallet standards:

1. Pallets should be built with four-way fork entry, so that they can be picked up from all sides.
2. Clearance between top and bottom pallet decks should be 3⅝″, so forks can be slipped inside easily.
3. To prevent damage by stevedoring slings, pallets should have an overhang of 3½″ on the 48″ side, forming what is known as a "wing type."
4. Pallets should be built so that damaged components may be easily replaced, and to conserve space on return shipments they should be capable of being knocked down.
5. Pallets should be strong enough to withstand stationary loads of 12,000 pounds.[4]

The possibilities of palletized unit loads are almost unlimited, and certainly they are not being utilized to anything like their capacity. Semi-finished products of irregular shape but requiring no protective packing may be developed into palletized loads with the aid of steel straps or pallet sides. Certain types of goods may be formed into unit loads with steel strappings, without the use of pallets. Modern packaging, material-handling and shipping practices must all three improve together in order to bring about reduced costs in production and distribution.[5]

The combination tractor–trailer–pallet–fork-truck is well worth mentioning. Because the tractor is more economical than the fork truck for distance hauling, it is often a good practice to have the fork truck load pallets on a number of trailers to be hauled by tractors for long inside hauls, between plants or to storage. Another fork truck can be used to unload the trailers at their destination. This feature is explained to show the effective use of fork trucks for short hauls as compared to the effective long hauls by tractor-trailers.

Conveyors

Conveyors represent an almost romantic phase of material handling because of the infinite number of operations they can accomplish. One manufacturer of conveyors advertises twenty-two different kinds. Half that number will illustrate the versatility of conveyors:

---

[4] "Pallet Ideas that Cut Shipping Costs," *Modern Industry,* Vol. 16 (December 15, 1948), pp. 100, 102.

[5] The Brooklyn Naval Depot reports that cars formerly requiring fifty-six man-hours to load are now being loaded with fork truck and pallet system in less than one man-hour.

Apron
Belt
Carrousel
Chain
Chutes
Coal and ash
Elevators
Gravity roller
Gravity-roller spiral
Hoists
Live roller
Overhead trolley
Oven
Portable
Vertical

The coal industry furnishes an outstanding example of the use of the *belt conveyor*, which is hauling heavier loads of bulk materials over longer distances almost every year. The conveyor has so many uses in production, handling and storing that it has led to the expression "Belt-Conveyor Era." Thomas A. Edison was probably responsible for the first adaptation of the conveyor belt to coal mining when (1890) he worked out several improvements for reviving a New Jersey coal mine. He designed a troughed rubber belt five hundred feet in length, which was used successfully for two years. By 1950, there were about one thousand miles of belt conveyors in underground mine operations. However, this mileage represents less than 20 per cent of the potential use for coal conveyors.

The results of using belt conveyors in coal mining are indicative of their possibilities in other fields. The coal industry reported that with the use of 240,000 fewer men than in 1920, nearly 51,000,000 more tons of coal were mined in 1947. Outstanding production achievements are possible only when the conveyor's continuous flow can be maintained. Mechanization of coal mining requires conveyor handling of the coal in order to provide steady production. Without the conveyor system to keep pace with continuous cutting and loading machines, the advantages of mechanized operations would be quickly lost. Figure 13.5 shows coal being carried by a rubber-belt conveyor from outside piles to stokers in an electric power plant.

The *trolley (overhead) conveyor* has a wide use in business and industry because of the range of its capacity, flexibility and length. This conveyor is an endless chain with joints operating in a vertical position, suspended by trolleys from an overhead track. Conveyed products are hung from the trolley joints, or if they are light in weight may be suspended from any portion of the chain. The path of the trolley conveyor may run along a horizontal plane, turn up or down, go around corners or take any other direction necessary to perform its function or avoid other operations in its path. The trolley conveyor can be used for transportation, storage, processing and assembly. Details of some of these uses include:

1. Moving incoming parts and materials from platforms to storage, and outgoing materials and parts from storage to shipping platforms.
2. Moving materials and parts from storage to production centers, and between production centers.
3. Moving between buildings.

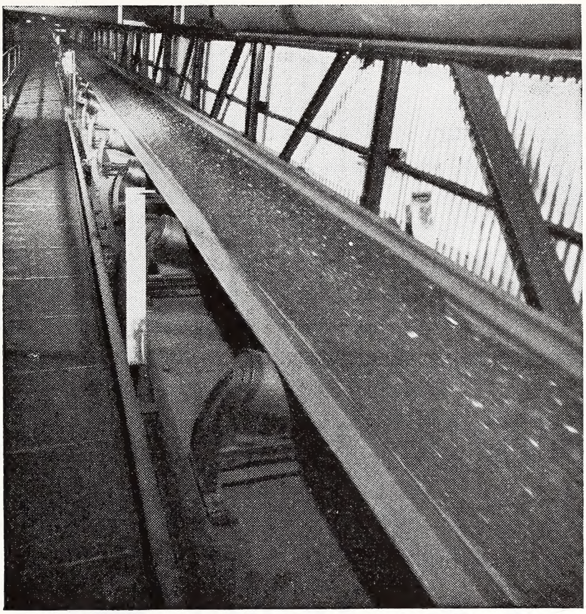


FIGURE 13.5

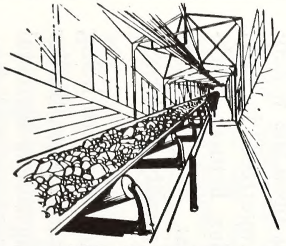
Rubber Belt Conveyor Hauling Coal

4. Providing temporary storage between operations, or in the warehouse.
5. Moving work-in-process through inspection to packing.
6. Towing industrial trucks in warehouses and other places.
7. Handling parts for spraying, sanding, washing, drying, sandblasting, enameling, heat treating and many others.
8. Pouring and oven baking in foundry operations.

The conveyor cuts the cost of performing many operations such as spraying, dipping and heating; it speeds production by moving parts as soon as an operation is completed; it reduces trucking expense; and it releases floor space for more valuable purposes.

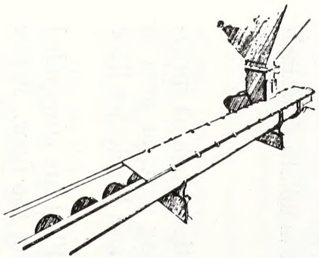
More than four miles of Chevrolet conveyor lines at Flint are suspended from monorails at bench height, rather than rolled along the floor. Better accessibility of parts to the worker is credited with stepping up production to a car a minute. Nonstop production via conveyors has been the watchword at the Zenith Radio plant since it was entirely "conveyorized" in 1947. Standardization of conveyors was expanded to include jigs, fixtures, workbenches and assembly sequence, with results reported as: "All production schedules reached or exceeded, unit costs cut, product quality improved, employee morale raised and labor turnover lowered."

Conveyors may be operated by power or gravity. Many uses are being developed for gravity conveyors, especially in multistory buildings. Roller spirals and gravity rollers are equipped with free-running rollers in metal frame. They have numerous designs such as curves, Y-shapes, switches, portables and many others adapted to special uses. Spiral chutes or slides are used when the pull of gravity is sufficient without the use of rollers.



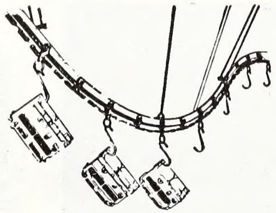
BELT CONVEYORS

Belt Conveyors are the efficient and low-cost method for mass horizontal or inclined transfer of bulk materials. High capacity, extreme flexibility for loading and discharging. Precision anti-friction bearing equipped idler rolls. If you handle bulk materials manually—investigate this economy.



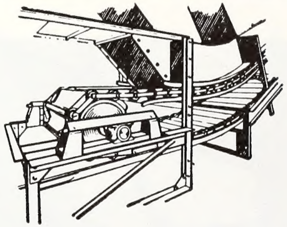
SCREW CONVEYOR

For handling bulk materials horizontally, on an incline or vertically. A self-contained unit which may be dust-proof or weather-proof if necessary. Simple—few moving parts—easily accessible. Drives are compact and may be self-contained.



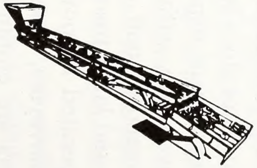
OVERHEAD CONVEYORS

Put ceilings to work—take traffic off the floor and turn aisles and storerooms into production areas. Relieve manpower by moving materials efficiently with Overhead Trolley Conveyors. Combine movement with processing such as cooling, heating, drying, pickling, etc.



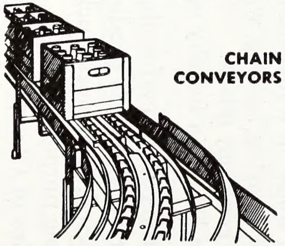
APRON FEEDERS AND CONVEYORS

Apron Feeders and Conveyors are suitable for handling fine or lumpy materials. Sprockets, chains, rollers and overlapping pans are made of manganese, steel or other metals. Chains on loaded run are supported on rugged rollers. Made in a range of sizes and types for numerous applications.



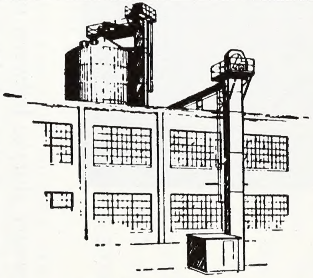
OSCILLATING FEEDER CONVEYORS

If you handle sharp, abrasive or hot materials, the "PA" and Hydra-Flo oscillating and vibrating feeder-conveyors may reduce handling costs. Can be installed in "tight spots" where clearance is minimum. Material may be fed or discharged at several locations. Any length. Trough widths 12" to 48".



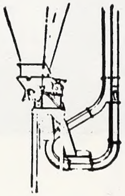
CHAIN CONVEYORS

Chain conveyors are made in two broad classifications. The drag chain type which operates in a trough and conveys bulk materials such as saw dust, cement, coal, ashes, etc. The single or multiple strand chain type, with a flat surface or attachment to support the product being handled, for conveying crates, coils, bottles, logs, packages, etc.



BUCKET ELEVATORS

Investigate the economies of Bucket Elevators, Conveyors and Carriers. Made for all capacities. Line includes the Centrifugal, Internal, Perfect Discharge, Continuous, Gravity Discharge types and Pivoted-Bucket type.



BULK-FLO ELEVATOR, FEEDER, CONVEYOR

For efficient mechanical handling of bulk, flowable, granular, crushed, ground and pulverized materials that are non-corrosive and non-abrasive. Self-feeding, self-discharging, self-clearing. Handles material gently with minimum breakage, degradation or dusting. Travels horizontally, vertically or on an incline.

Courtesy: Link-Belt Company

FIGURE 13.6

Representative Conveyor Types

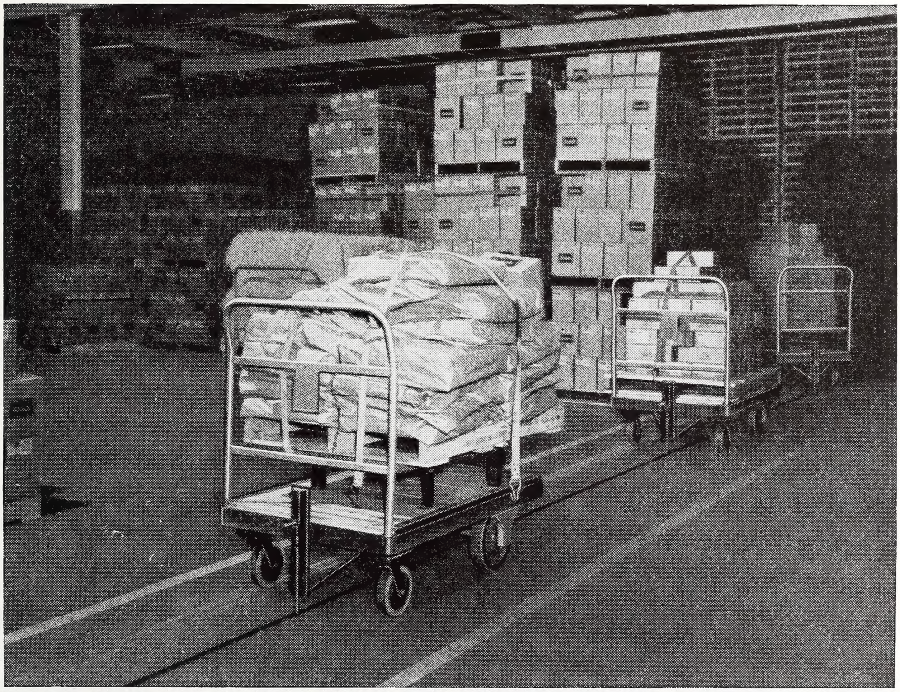
Miscellaneous aids

Improvements in the operation of material-handling equipment are almost without end as long as the system is under the supervision of mechanically-inclined and imaginative men. Application of handling principles to the transfer of materials between automatic machines is an example of such ingenuity. *Automatic loaders and unloaders* can unify the operations of a group of automatic machines, thus combining standard automatic machines into a special operation. The tying together of machines in this fashion not only reduces production costs, but permits later rearrangements for different combined operations.

The *subfloor tow-line* is another aid to the conveyor method of material handling. This equipment moves tow-pinned dollies and hand trucks over predetermined paths to stockroom or production-storage centers without overhead equipment or floor-obstructing devices. Such invisible tow-trackage is easily laid in new concrete floors. The conveyor chain runs just beneath the floor level, and is protected by floor-level cover plates. If a relatively complete system is installed, it will be flexible enough to meet

FIGURE 13.7

Subfloor Tow-Line Conveyor



Courtesy: Mechanical Handling Systems, Inc.

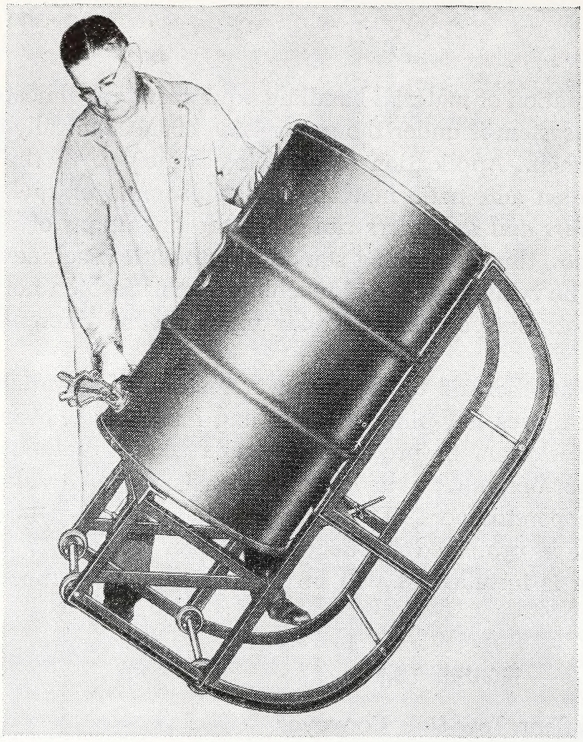


FIGURE 13.8

Rocker Type Truck

Courtesy: Morse Manufacturing Co., Inc.

most changes in operating conditions. Figure 13.7 shows pallet-loaded hand trucks being conveyed by subfloor tow-line.

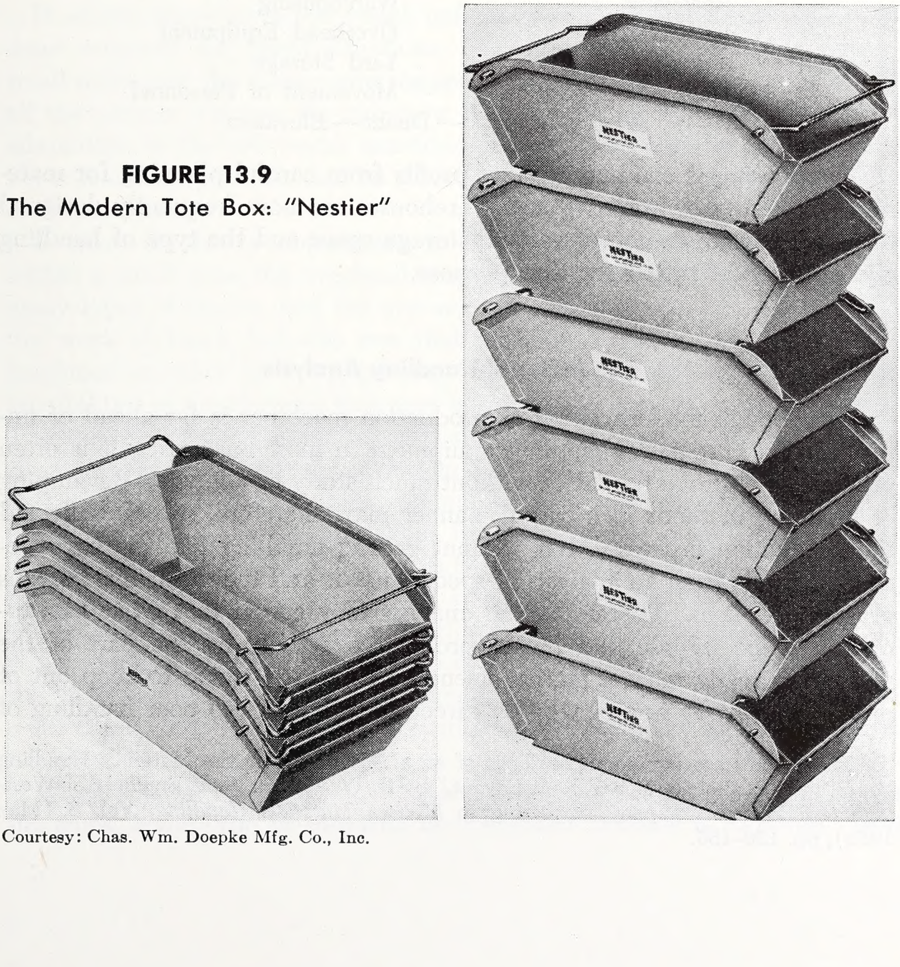
A handling aid based on the *rocker* principle expedites the movement, positioning and even the use of barrel containers. Figure 13.8 illustrates how heavy paint, chemical or oil drums can be moved and positioned with the aid of this rocker frame.

The *tote box* is probably the oldest of the aids to material handling. Although of homely origin, it has had as much technical study as many other pieces of handling equipment. From the original square box for "toting" tools and materials, its shape has been changed so that it can be either nested or tiered, with its contents visible from either end when tiered. The end handles, which facilitate tiering, are also used to transport it by monorail conveyors. Figure 13.9 illustrates the patented "Nestier" tote box.

A unique use of material-handling equipment is for *moving machines to the job,* rather than moving work to the machines. In a rather common operation where large and small presses are used in sequence, the American Seating Company claims that it saves 35 per cent in handling costs and 40 per cent in floor space by mounting its small presses on heavy steel pallets and moving them to the large presses as needed. The plant engineer reports that "large, counterweighted fork trucks pick up the small presses and move them from job to job. No change in layout was required in the straight-line positioning of the large presses. However, almost all of the floor space formerly required for the small presses has been saved." This idea of moving the mountain to Mohammed is receiving increased attention as industry reports cases where it has been applied successfully.

Operating aids for most types of material-handling equipment include common-sense rules for keeping down operating costs and injuries. Aisles should be plainly marked in white or orange floor paint and be kept clear of overhead obstructions. Mirrors should be placed at blind corners to reduce safety hazards. Cooperation of production workers expedites handling and reduces accidents. Handling costs are reduced when drivers are regularly assigned to the same trucks. Another operating aid is the assignment of single responsibility for lubrication and upkeep of all material-handling equipment. Often this responsibility is divided between two or more activities such as electrical and mechanical maintenance.

FIGURE 13.9
The Modern Tote Box: "Nestier"



Courtesy: Chas. Wm. Doepke Mfg. Co., Inc.

Material Handling and Plant Layout

Most layout engineers attest to the valuable aid contributed to their work by men skilled in the methods of material handling. When such aid and advice is not sought, the planning job done by the layout engineers is likely to be the poorer. Modern business layout of any kind requires facilities designed to do specific tasks effectively and at lowest possible cost. To meet the required work and cost objectives, facilities of many types must be considered and coordinated, not the least of which is material handling. Layout planning is aimed at lower handling costs, reducing safety hazards and improving housekeeping. Obviously, therefore, the person responsible for material handling can make a real contribution to any layout.

The mere listing of some of the major considerations involved in good layout for production plants, warehouses or even large offices, illustrates the part played by facilities for material and personnel handling — facilities which cost much more to install when they are not included in the original plans. All of the following areas involve material-handling plans and equipment:[6]

Receiving
Rail Traffic
Shipping
Plant Transportation
Warehousing
Overhead Equipment
Yard Storage
Movement of Personnel
Floors — Aisles — Doors — Elevators

Warehousing is one activity that profits from careful planning for material handling. For example, new warehouses are now frequently designed for maximum utilization of vertical storage space and the type of handling equipment best suited for that purpose.

The Material-Handling Analysis

Even though modernization of production machines is far ahead of improvements in material-handling equipment in most businesses, it is often possible to improve the latter without much study or analysis. Revamping of handling methods in a casual manner may, therefore, substantially aid the production processes, but without getting anything like the improvement possible from an analysis of specific needs and the mechanical means of meeting them. Thoroughgoing analysis may reveal that what has appeared to be intense and highly productive activity on the part of the workers is really more a matter of energy expended trying to keep out of one another's way in a congestion directly attributable to poor handling of materials. Again, what appears as cramped floor space may actually turn into space under modernized handling operations. Matching handling operations with the best known techniques suited to the situation has frequently postponed the supposed need for plant expansion.

---

[6] These items are paragraph headings of an article on "How the Materials Handling Man Can Contribute to Better Plant Layout," by R. W. Mallick, Staff Engineer of Westinghouse Electric Company, appearing in *Modern Materials Handling*, Vol. 8 (May 1953), pp. 150–155.

A congestion of materials between departments and around machines is a fair indication that the handling system has not kept pace with increased productivity. It is also reasonable to assume that such a material-handling situation is actually impeding output and creating a dangerous work area. Poor utilization of valuable floor space usually indicates poor material handling. No productive system can be more efficient than the material-handling plan which accompanies it.

Many questions must be answered in making an analysis of any material-handling situation. Such questions concern space, persons, machines, materials and methods. A complete survey may indicate a need for several types of handling equipment. It may even indicate the need for several types of conveyors. The data required for an analysis of "space" may lead to hundreds of questions. There are so many ramifications to the subject that an adequate job can be done only by a person who has had training and experience with all phases of the subject.

However, there are a few rough indicators of the general types of equipment required for given situations. For example, a continuous flow of small units over the same route suggests some type of conveyor system. Of all the various systems, the conveyor type is most likely to require special adaptation to the job under consideration. It may well be that the conveyor-handling problem can be solved best with a combination of several conveyor types.

If relatively heavy objects are to be moved into any and every spot within a small area, the overhead crane is a possibility. But there are also many types of cranes, and the one selected must not only be adaptable to the work at hand, but also one that does not interfere with production machines or other floor equipment. "Other equipment" introduces many possibilities of interference that may influence the type of crane to be used. The mobility of truck-mounted cranes makes them more desirable in many situations than those which operate on fixed rails. In spite of the advantages of handling with cranes, the demand for overhead space for storage or utility services may eliminate them from consideration entirely.

Long-distance moving of materials from a central point, such as a receiving platform, to a number of use stations, indicates the selection of a tractor and trailers. But even after this decision has been made, there still remains the question of which type of tractor will be most useful. Since the trailer-and-tractor system will generally be used in combination with a lift truck, these three types of equipment would have to be considered together.

When it is necessary to move materials higher than the capacity of the lift truck, some type of movable or stationary elevator is required. Lifts from ground to truck or boxcar level may suggest both the elevator and fork truck if the job is large enough.

When the movement of materials — whether intermittent or regular — involves a number of routes, the lift truck probably offers the best solution. The flexibility of the lift truck makes it the first line of offense for many handling jobs. It can fit into a large variety of loading and unloading jobs, as well as stacking, moving and storage assignments. In addition to these daily chores, the use of various attachments such as scoops and crane arms in place of the standard fork equipment, enables the lift truck to perform another long list of routine material-handling jobs. One manufacturer of all types of material-handling equipment states that "because it combines features of all other materials-handling systems, the lift truck will be found adaptable to almost any problem, especially those not easily solved by the use of conveyors, cranes or tractor–trailer combinations."

Breaking down the analysis

Material-handling analysis may be set up under five general headings: Production, Receiving and Storage, Packing and Shipping, Costs, and Handling Systems. Under each of these general headings there are a number of subtopics for investigation. In selecting the industrial truck system to be used, for example, basic information is required about distances traveled, tons per trip, trips per shift, and the number and height of the tiering operations in store and stock rooms.

It is not always obvious, but true nevertheless, that those charged with the production processes must be interested not only in the handling of materials while in their possession, but with the entire handling process from raw materials to the ultimate consumer. It would not be feasible to set up a new handling system in one department that increases handling costs in other departments. The same conclusion is valid in material-handling relations with outside firms. The way in which a company receives its supplies may decidedly affect its handling costs, and cooperation with the supplier is one way to reduce such costs. But the unilateral adoption of a new receiving and handling plan by a buyer may so increase his supplier's costs as to make the new prices outweigh his handling savings. Likewise, a change in the method of delivering to customers may so increase the customers' handling costs as to price the seller out of the market until he reduces his internal handling costs.

Cutting handling costs

Determination of handling costs and the installation of new handling equipment are closely related. Improved handling methods are often disregarded simply because there is no plan for determining their costs. When manual handling costs are known, the changeover to mechanical methods usually results. It frequently happens that production motion-and-time study involves material-handling operations, with consequent suggestions for handling improvements. This is especially true when part of the operator's activity involves the handling of materials. The establishment of standard operation times dictates the elimination of those operator motions which can be done by machines. It should also be noted that to the extent that the accident rate of manual operations can be reduced by the use of mechanical equipment, the cost of handling is also reduced.

There are several accepted methods for figuring the cost of handling materials. Only to the extent that the method used is applicable to the case under consideration are its results dependable. An industrial truck manufacturer offers the following plan for comparing manual and mechanical methods for transporting 180 tons of materials 200 feet from stockroom to processing machines. It is estimated that without power equipment this job would require 10 truckers, each making 60 trips per day and carrying 450 pounds per load. With a 2000-pound-capacity mechanized fork truck, the 180 tons could be transported the required distance by one-ton pallet loads in 7½ hours. On the basis of these estimates, the comparative costs would be:

Costs Per Day

With Manual Trucks		*With Power Trucks*	
Labor @ 85c per hour	$68.00	Driver @ $1.00 per hour	$ 8.00
Social Security Tax	2.72	Social Security Tax	.32
Workmen's Compensation	1.00	Workmen's Compensation	.16
Truck Depreciation	.30	Truck Expense	4.03
Total	$72.02	*Total*	$12.51

In this calculation, the expense for the mechanical truck is important. Based on a total cost of the electric truck and the equipment for it at $6240 (of which the figure for the truck alone is $4100, for the battery $600, for charging equipment $840, and for 200 pallets $700), the breakdown of the annual expense is calculated as shown in Table 13.1. While this example is admittedly oversimplified, it gives an idea of the kind of savings to be expected by changing over to mechanical handling methods. The figures in this case show daily savings of $59.51, or 83 per cent, with annual earnings on the investment of 248 per cent.[7]

There are two principal methods for determining material-handling costs. One plan uses formulas developed by the Materials Handling Division of the American Society of Mechanical Engineers, to fix the time required for amortizing the investment from savings. The other plan is based on

---

[7] To compute this last percentage, multiply the daily savings ($59.51) by the number of working days in the year (in this case, 260) and then divide the product ($15,472.60) by the cost of the truck and its equipment ($6240). This comparison of hand and mechanical trucking costs was compiled by the Baker-Raulang Company of Cleveland, Ohio.

TABLE 13.1

Breakdown of Annual Expense for Fork Truck

Item	Costs	
1. Depreciation		
a. Truck, at 10%	$410.00	
b. Battery, at 20%	120.00	
c. Charger, at 6⅔%	56.00	
d. Pallets, at 20%	140.00	
TOTAL		$ 726.00
2. Tires		100.00
3. Maintenance		
a. Truck	$164.00	
b. Battery	24.00	
c. Charger	33.60	
TOTAL		221.60
4. Replacement of Pallets		70.00
5. Electricity		82.00
6. Insurance		10.00
TOTAL ANNUAL COSTS		$1209.60
Expense Per Day		4.03

cost per unit moved. Both methods are employed in making economic surveys to determine what advantages will accrue from suggested installations. The ASME allowances cover investment, insurance, taxes, maintenance, depreciation, power and supplies. Savings in fixed charges and direct labor, credit for increased production, rate of equipment utilization and original cost are also considered in the formula. Whether or not the time required for amortizing the investment fits company policy determines whether the contemplated change is economically feasible.

The other plan uses a cost-per-unit basis with equipment investment spread over the life expectancy of the items involved. The proponents of this plan contend that "how long it will take to pay for itself" does not give a true picture because it fails to take into account the difference between long- and short-life equipment. It is to circumvent this alleged deficiency in the economic calculation that the unit costs are based, in part, on life expectancy of the equipment.

Organization

As with most other activities, the organizational setup for material handling depends on the size of the concern and the nature of its product. Naturally, handling activities assume more importance in the total functioning of a company as the number of uses for them increases. When, for example, not only transportation of materials but some of the operations performed on them, such as dipping and drying, can be handled mechanically, the activity becomes more important and may well occupy the full time of a manager. Under such circumstances, material handling requires constant attention for smooth operation and possible improvements. When considering situations involving both the transportation and production functions of lift trucks and a maze of constantly moving conveyors of various kinds, one can easily conclude that such responsibility might challenge a trained and experienced person of executive rank.

In many plants and other business establishments, the material-handling problem is relatively simple. The person in charge of the system may well combine his duties here with such activities as motion-and-time study, work analysis and planning, or some similar function. Irrespective of the size of the installation, its maximum value will accrue only when it has the attention of some member of management and is a definitely assigned responsibility of some one person. A material-handling system is usually automatic, but it cannot think itself into coordinated operating relationships and improved layouts: it must be under the control of a single guiding mind capable of comprehending the system as an entity.

Objectives and Principles

The chief objectives of handling techniques are to reduce costs and increase safety by improving controls. To accomplish these objectives, all handling should be reduced to an absolute minimum, and then done by machines as far as possible. If the "don't touch it" idea is applied assiduously, costs will be reduced automatically. The most fruitful fields for the application of handling principles are those production processes where the flow of materials should be automatic between machines and assemblies, and such production operations as dipping, spraying and drying. Proper handling reduces costs through increasing productivity, saving space and relieving fatigue. Many improvements in the production processes have been initiated by applications of material-handling principles.

Continuous study by specialists has produced a group of handling principles which have supplied effective rules of action. The following list is suggestive:

Reducing Handling Costs

1. Elimination of unnecessary handling is the first step in saving costs.
2. Combining operations minimizes internal transportation.
3. Gravity is the cheapest form of handling.

Planned Layouts

4. Planned layout should provide continuous flow through proper coordination of processes and assemblies.
5. Layout should be set up on a unified plan, to accomplish over-all handling economies.

Handling Equipment

6. Existing equipment should be used most effectively before considering substitutes or replacements.

7. The simplest equipment applicable to a given situation is most desirable.
8. Other things being equal, standard equipment is preferable to special.
9. Handling equipment adapted to special circumstances may not be readily applicable to other situations.

Costs

10. Equipment cost should be figured on a service basis rather than on purchase price.

Operations

11. Handling operations should be coordinated whenever possible, to reduce machine idleness.
12. Handling operators should likewise synchronize their work whenever possible, to reduce operator idleness.
13. Largest units practicable should be used in loading and unloading operations.
14. To minimize sorting of materials, avoid mixing them in the first place.
15. Maximum vertical storage saves floor space, and reduces costs.
16. Effective handling requires related packaging.
17. Operator training, equipment maintenance and the elimination of operating hazards definitely improve handling operations.[8]

Conclusions

If material handling is to reach its maximum potentialities, it must have the active interest of top management. If the concern is large enough to warrant it, a material-handling engineer should be employed, and given authority sufficient to set up and maintain an efficient system. The handling engineer must be able to work cooperatively with the packaging and sales departments, so that there will be no conflict between the size of the units to which the handling system is geared and the size of the units intended for distribution to the customers.

Material handling goes beyond mere transportation to include various controls and several phases of the storage operation. Floor plans should always give weighty consideration to facilitating material handling. Comparison of machine and hand costs of handling is only a part of the advantage of a coordinated system. The quality and quantity of production, reduction of damage and waste, relief from congestion and the improved housekeeping it makes possible, better utilization of floor space, relief of physical strain and safe working conditions — all must be considered in designing a good material-handling system.

One of the major reasons preventing medium-sized companies from adopting modern handling operations and methods more rapidly is their technical inability to analyze either current manual handling or a mechanical substitute for it from the standpoint of costs and savings. With the present lack of general knowledge of this subject, it will be up to those concerns which sell material-handling equipment to make the advantages of their products more generally known.

---

[8] These rules are summarized from L. P. Alford and John R. Bangs, *Production Handbook* (New York: The Ronald Press Company, 1948), pp. 937–938.

QUESTIONS

1. How would you answer the manufacturing executive who claims that material handling is a small part of his costs?
2. What is the relation of material handling to direct and indirect labor?
3. What is the average weight relation between total materials handled as compared to the finished product? What average percentage of total production costs is absorbed by material handling?
4. How can material-handling techniques improve inventory-taking?
5. Explain the outstanding contributions of material handling to production-worker fatigue and safety and to the utilization of floor space.
6. Which, in your opinion, is the most universally used of all material-handling equipment?
7. Discuss the close relation between the pallet and the fork truck.
8. Compare the development of material-handling equipment during the past decade with that of the preceding fifty years.
9. What is the relation among palletizing, packaging, storing, inventory-taking and shipping? What is the key to this relationship?
10. Explain some of the reasons why palletizing has developed so slowly.
11. What are some of the primary uses of conveyors in industrial, mining and large retail concerns?
12. How has the lowly tote box been adapted to facilitating storage and distribution?
13. What is the relation of material handling to layout?
14. Describe the plan and methods you would follow, as a consultant, in advising your client about the solution of his material-handling problems.
15. What elements would you consider in figuring comparative handling costs by manual and mechanical methods?
16. How should material handling be organized for a medium-sized industrial concern? What difference would the type of product make in your plan?
17. If you were asked to establish four principles (rules for action) for selecting material-handling equipment, what would you propose?
18. What effects do dependable pallets have on the general adoption of unit-load handling in external transportation?
19. To what extent do wholesale and retail businesses have an opportunity to adopt some of the handling techniques now used by industry?
20. What advantage does the monorail conveyor have over the moving belt? Mention one possible use for the monorail which is not practical for the moving belt.

CASE PROBLEM

The Enterprise Iron Foundry

The Enterprise Iron Foundry has been in operation since 1910, making castings for industry. It was started by three foundrymen friends in a garage and moved to its present quarters in 1912, financed by endorsed bank loans. Because of tight financing, it was not able to install the best-known equipment when the new foundry was built. However, reasonable success over the years provided the capital for up-to-date equipment. The outstanding need, as the owners finally realize the chief cause of their high competitive costs, is a complete overhaul of their handling equipment.

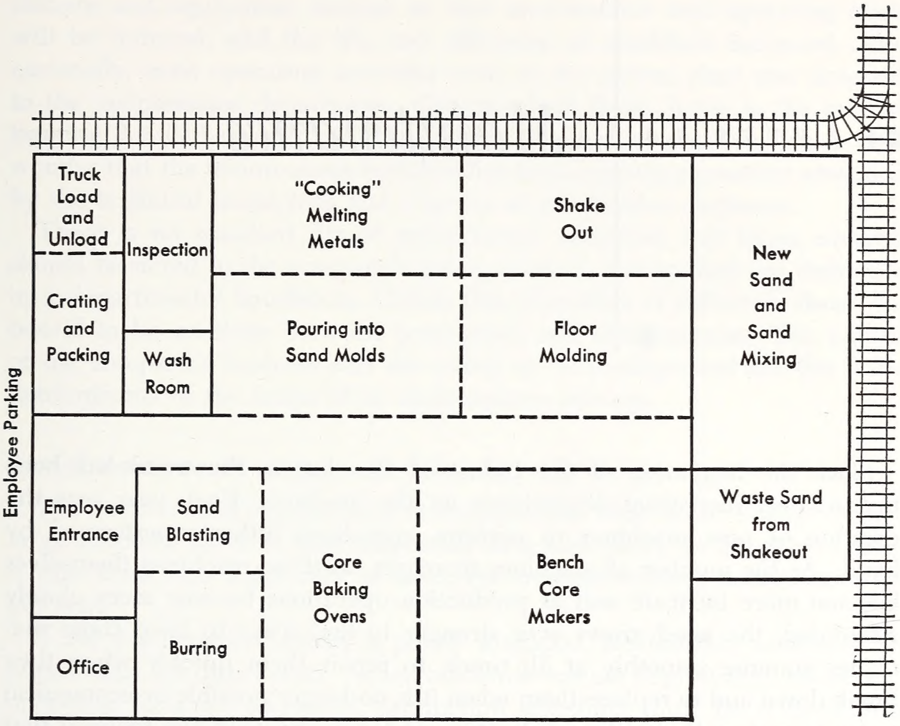
The sketch shows a ground floor 165′ × 240′, with a small offset at the end of the building where new sand is stored and prepared for the molders and core-makers and waste sand is dumped after the castings are shaken out of the molds. The scale of the drawing is 30 feet to the inch.

Internal transportation is all done by carts, wheeled ladles and racks. The racks are used to take the finished sand cores to the bake ovens, and from the ovens to the floor molders or the pouring room. Small ladles of molten iron are carried from the "cooking" room to the nearby molds in the pouring section. Large pots of molten iron are wheeled to the pouring room, where the pouring is done by dipping with hand ladles. The large pots are also wheeled to the floor-molding department. Hand carts carry castings to the sand-blasting and burring departments. From this section the castings are later wheeled to the packing and shipping rooms.

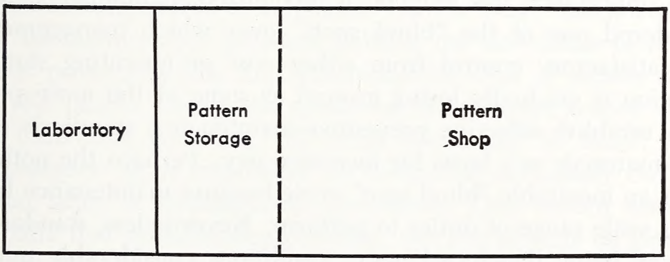
Hand carts are also used to haul treated sand to the core-making and floor-molding departments. The same type of cart hauls the poured molds to the shakeout machines, and the waste sand from shakeout to the sand dump. Pig iron is unloaded by gravity conveyors from freight cars to the cooking room. A similar type of conveyor unloads sand from freight cars to the sand-mixing sheds. Heavy hand trucks are used to carry the large castings from the floor-molding department to the packing and shipping room.

The metal racks that carry the sand cores are large and heavy. They are equipped with wheels for hand pushing. Loaded, they probably weigh 500 pounds, but the cores they carry do not weigh over 10 pounds on the average. The small hand ladles weigh about 10 pounds empty and twice as much when loaded with the molten metal. The large pots for carrying molten metal weigh about 500 pounds loaded. They are equipped with wheels of the carriage variety. The general-purpose hand carts are similar in size to the large pot carts but equipped with deep steel bodies which can be dumped. Their weight depends on their contents, but in any case can be regulated by the amount of material loaded into them.

The second floor covers a portion of the ground floor at the office end of the building. About half of this floor is occupied by the pattern shop, while the other half is divided between the laboratory for examining test bars taken from each of the "heats," and a storage room for patterns. All transportation between the second and ground floors is carried by hand, by a stairway located in the packing room. Both test bars and wood patterns are light in weight, so that an elevator is not actually necessary.


Truck Load and Unload
Crating and Packing
Inspection
Wash Room
"Cooking" Melting Metals
Pouring into Sand Molds
Shake Out
Floor Molding
New Sand and Sand Mixing
Employee Parking
Employee Entrance
Office
Sand Blasting
Burring
Core Baking Ovens
Bench Core Makers
Waste Sand from Shakeout

GROUND FLOOR


Laboratory
Pattern Storage
Pattern Shop

SECOND FLOOR

Enterprise now employs 625 men, of whom 46 are giving full time to internal transportation.

PROBLEM. Redraft, if necessary, the floor plans so as to provide for the installation of modern equipment necessary to reduce handling costs. Designate the kind of material-handling equipment you would recommend for the transportation problems involved. How many of the 46 transportation laborers will your new plan eliminate? What advantages to the foundry's productivity will result from your plan?

CHAPTER 14 Maintenance

Since the beginning of the Industrial Revolution, the trend has been toward ever increasing dependence on the machine. Each year sees the creation of new machines to perform operations hitherto performed by hand. As the number of machines increases, as these machines themselves become more intricate and as production operations become more closely scheduled, the need grows ever stronger to find ways to keep these machines running smoothly at all times, to repair them quickly when they break down and to replace them when it is no longer possible or economical to try to restore them. To satisfy this need, industry long ago realized that it must establish separate maintenance departments that could devote their full attention to such problems.

But though its importance has long been recognized, maintenance has often been considered one of the "blind spots" over which management could not exert satisfactory control from either cost or operating standpoints. That opinion is gradually losing ground as some of the more progressive concerns establish effective preventive-maintenance standards for time and costs of materials as a basis for incentive pay. Perhaps the notion of maintenance as an inevitable "blind spot" arose because maintenance has always had such a wide range of duties to perform. Nevertheless, standards for control are now being developed under conditions considerably more varied and technical than those of two or three decades ago. The maintenance function has clearly become too important for management to rely any longer on hit-or-miss methods in this area.

Scope of maintenance

Maintenance is responsible for the upkeep of buildings, machinery, equipment and numerous miscellaneous items and activities. It has charge of the broad functions of "housekeeping," including janitorial and cleaning work of all kinds. Periodic inspections for detecting in advance the need for repairs and replacements should be one of its primary responsibilities. Progressive maintenance makes suggestions for the improvement of machinery and equipment designs so that maintenance and operating costs will be reduced, and the life and efficiency of machines increased. Occasionally, even operating activities such as the power plant are assigned to the maintenance department. On top of all these duties is the task of keeping detailed records of all maintenance activities and their costs. No wonder that the maintenance function has been receiving constant attention by the technical magazines and a group of progressive engineers.

There is no standard list of maintenance activities, but those covered should be noted in the company's policy manual, and spelled out definitely in a departmental handbook. Unless this procedure is followed, there are bound to be conflicts between production and maintenance. The nature of the company's business and the policy of its management are the basic determinants of the scope of its maintenance services.

Cost of maintenance

The *direct cost* of maintenance is an expensive item in the budget of any large concern, but it is most important as a cost factor in industry, where it runs from 2 to 8 per cent of sales, the over-all average being about 3½ per cent.[1]

If the maintenance activity is poorly managed, the *indirect costs* may be higher than the direct costs. When machines are not kept at high efficiency, operating costs are increased, production schedules must be revised, and delivery promises become problematical. In addition, machine downtime (loss of machine time for adjusting, repairing, etc.) may result in large wage payments for idleness which is beyond the operator's control. Such costs are impossible to calculate. On the other hand, a scientific approach to the maintenance problem reduces the downtime of machines, prolongs their productive life, and minimizes the cost of repairs and replacements.

The proper amount to spend on maintenance varies with the problems of individual concerns, and must eventually be based on judgment and experience. It is impossible to determine accurately the savings resulting from superior maintenance operations. One cannot estimate the cost of repairs that maintenance prevents, nor the savings on productive machine-hours for breakdowns that do not occur. However, over-all maintenance costs for comparable periods are a good index of how well the program is working at any given time.

In many cases, proper maintenance is still considered something to wish for but do little about. Under such conditions, managament can only try to keep maintenance costs down, as a necessary evil. Such treatment frequently appears to give satisfactory results only because delayed maintenance means renewals rather than repairs to machines and buildings, with consequent charges to the capital account rather than to upkeep.

---

[1] See "The Cost of Maintenance in Seventy-Six Industries," *Factory Management and Maintenance,* Vol. 105 (June 1947), p. 96.

On the other hand, some concerns have gone all out on a preventive program without adequate study or subsequent evaluation of its results. In such cases the cost of maintenance can be excessive compared to the results obtained. While the pursuit of this extreme is probably less expensive, on the whole, than inadequate maintenance, it represents little more than amateur toying with a scientific problem.

Some cost formulas have been used with benefit by individual companies. They are generally based on ratio relationships between maintenance and other costs. An example is the ratio of maintenance expense to the value of equipment. Another is the ratio of maintenance expense to operating costs or net sales. The numerical ratio of the maintenance force to the total plant force is a favorite measure. Any one of these ratios may be excellent for individual cases, but their value for comparisons among companies is extremely doubtful. There are too many influencing variables such as age of the plant and its equipment, types of operation, and the number of working hours in a day, for dependable comparisons.

Property records

The prerequisite to any kind of orderly machine maintenance is an equipment inventory. Properly compiled and used, it will save its cost many times over. A simple record can be kept on a 5″ × 8″ file card for each piece of equipment, identified by the serial number of the machine. The numbering of equipment should be by department, allowing flexibility for additions and changes. On its face, the record card should show all relevant data about the piece of equipment, such as the date of purchase, cost, weight and other details. When advisable, drawings, specifications, and parts lists should be attached. This record can be helpful on many maintenance jobs, and should be referred to on all jobs for the purpose of showing, on the reverse side, the nature of the fault, the cost of correcting it, and suggestions of the inspector. The reverse of the inventory card should contain a running record of the machine's service. These machine-history files, from the cradle to the grave, can also be used profitably in helping to fix inspection schedules and suggesting equipment changes for higher productivity and lower upkeep costs.

Because of the scope of its coverage, the maintenance department should maintain an over-all property map, detailed plans and specifications of all buildings and service lines between them, departmental floor plans with machine layout, and maps showing underground piping and services. To the experienced, it may seem trite even to mention maintenance's needs for such primary records and maps. It will be more surprising to learn how many concerns grow large, with active maintenance departments, but without some of these records. The costly evidence of past dereliction is frequently seen in the form of narrow trenches dug near locations suspected of harboring uncharted pipes and other servicing equipment. Similarly, walls and floors are opened to look for unmarked wires and pipes inside of buildings. Someone knew all the answers once, but he died before the elementary principles of management secured a foothold with his company.

Preventive Maintenance

Maintenance may be either remedial or preventive. The *remedial* approach calls on the maintenance crew to make repairs or renewals as they become necessary because of operating failures. When this plan is carried to its logical conclusions, maintenance becomes a series of responses to emergencies reported by machine operators and supervisors. The purpose of the *preventive* approach is to insure the detection of maintenance needs in advance of breakdowns.

Preventive maintenance is based on scheduled inspections. It practically eliminates major breakdowns, prolongs the productive life of buildings and equipment, cuts maintenance costs when judiciously scheduled, and is an aid in meeting delivery promises. Scientifically scheduled inspections, based on carefully prepared check lists, lead to real preventive maintenance. A complete preventive program demands the cooperation of all machine operators and supervisors throughout the organization, as well as watchmen and even routine workers who may well suggest conditions requiring attention.

Inspections

The first step in preventive maintenance is to make a property list of all items that have to be inspected. The next step is to determine how often these items must be inspected.

Frequency of inspection will depend on two considerations. The first of these is the relative difficulty of repairing or replacing a given piece of machinery or equipment. It stands to reason that items which are not likely to break down suddenly, or which are easy to repair when they do break down, do not have to be inspected as often as more delicate machinery does. The second consideration determining frequency of inspection is the importance of a given item to the productive process. If the breakdown of a particular machine will cause a serious disruption in the over-all flow of production, it will have to be inspected more frequently. An analysis of the property list will show that the care of many small production and auxiliary units can be left to departmental mechanics because the disruptive effects of improper maintenance of these units are relatively insignificant. If these criteria are followed, serviceable schedules for preventive maintenance will gradually be built up.

The following is a list of the types and frequencies of fifty general plant inspections made at the Kearney Works of the Western Electric Company:[2]

---

[2] Harry L. Husson, "Elaborate Maintenance Surveys Key to Plant Fitness," *Factory Management and Maintenance,* Vol. 105 (May 1947), p. 82.

Not Scheduled Regularly

Boiler accidents
Elevator accidents
Sprinkler leakage
Good housekeeping
Turbine inspection
Sprinkler shutoff

Daily Schedule

Watchmen's reports

Quarterly Schedule

Emergency stretcher stations
Carbon dioxide systems
Hoisting chains & slings
Electric trucks
Film storage
Fire insurance inspection
Gas and oil equipment
Gas masks
Ladders and scaffolds
Machine guards
Poisonous substances
Portable electric cranes
Safety belts
Scales
Temporary wiring
Double-check water valves
Sewage effluent
Sprinkler alarms

Monthly Schedule

Boiler and powerhouse
Underground flammable tanks

Six Weeks Schedule

Elevators
Exhaust systems
Fire & patrol boxes
Fire hydrants, etc.
Flammable tanks
Locomotives
Cranes

Four Months Schedule

Compressed gas cylinders
Portable furnaces & torches

Semiannual Schedule

Cotton fire hose
Electric temperature alarms
Underground sprinkler leaks
Machinery & equipment
Safety & waste containers
Steam containers

Annual Schedule

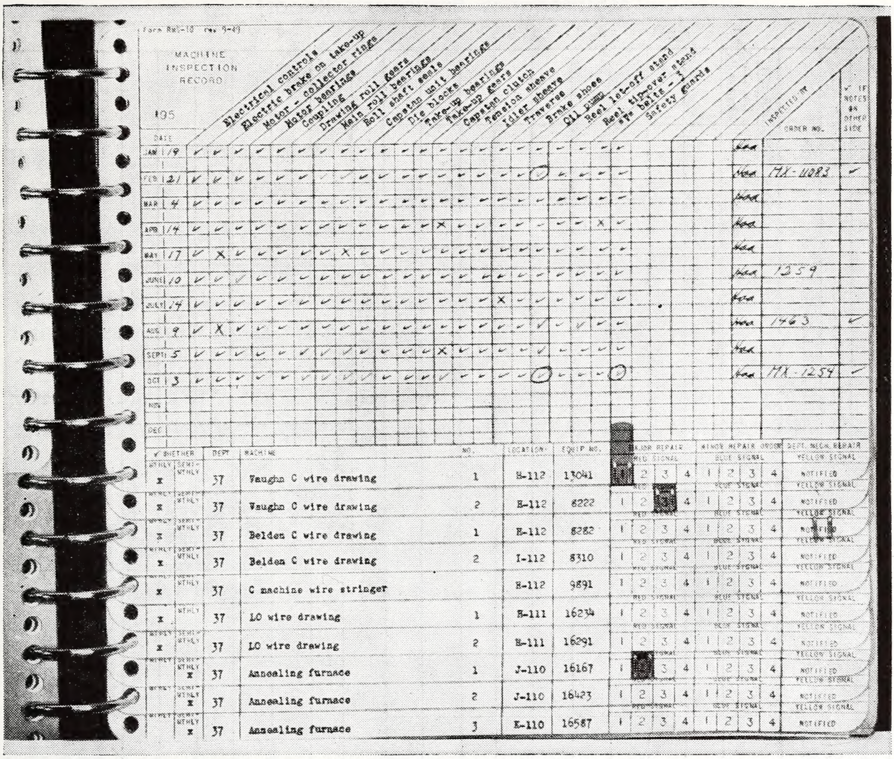
Fire equipment
Grounds & bulkheads
Powerhouse electric equipment
House & sprinkler tanks
Low-voltage electric systems
Sprinkler system pressure
Pressure test on coffee urns
Linen fire hose

This illustration shows the comprehensive scope of inspection, but it gives only a single listing to machinery and equipment, under the semiannual schedule. In most concerns, machinery and equipment are the outstanding items for an inspection schedule. The machines can be set up in groups for purposes of inspection, or each may be listed by number for individual inspection. In either case, inspections should be made on a fixed time schedule. Figure 14.1 illustrates the machine inspection record.

As has been suggested, there is some tendency to inspect unnecessarily for preventive maintenance — "just to make sure." Half of the value of a preventive program lies in determining realistic inspection schedules. The

FIGURE 14.1

Machine Inspection Record



Form RWS-18 Rev 9-49

MACHINE INSPECTION RECORD

195

Electrical controls
Electric brake on take-up
Motor - collector rings
Motor bearings
Coupling
Drawing roll gears
Main roll bearings
Roll shaft seals
Capstan unit bearings
Die blocks
Take-up bearings
Take-up gears
Capstan clutch
Tension sheave
Idler sheave
Traverse
Brake shoes
Oil pump
Reel let-off stand
Reel tip-over stand
"V" belts - 3
Safety guards

DATE		ORDER NO.	✓ IF NOTES ON OTHER SIDE
JAN	19		
FEB	21	MX-1083	✓
MAR	4		
APR	14		
MAY	17		
JUNE	10	1359	
JULY	14		
AUG	9	1463	✓
SEPT	5		
OCT	3	MX-1254	✓
NOV			
DEC			

✓ WHETHER MTHLY	SEMI-MTHLY	DEPT	MACHINE	NO.	LOCATION	EQUIP NO.	MAJOR REPAIR RED SIGNAL	MINOR REPAIR ORDER BLUE SIGNAL	DEPT. MECH. REPAIR YELLOW SIGNAL
x		37	Vaughn C wire drawing	1	H-112	13041	1 2 3 4	1 2 3 4	NOTIFIED
x		37	Vaughn C wire drawing	2	H-112	6222	1 2 3 4	1 2 3 4	NOTIFIED
x		37	Belden C wire drawing	1	H-112	6282	1 2 3 4	1 2 3 4	NOTIFIED
x		37	Belden C wire drawing	2	I-112	8310	1 2 3 4	1 2 3 4	NOTIFIED
x		37	C machine wire stringer		H-112	9891	1 2 3 4	1 2 3 4	NOTIFIED
x		37	LO wire drawing	1	H-111	16234	1 2 3 4	1 2 3 4	NOTIFIED
x		37	LO wire drawing	2	H-111	16291	1 2 3 4	1 2 3 4	NOTIFIED
	x	37	Annealing furnace	1	J-110	16167	1 2 3 4	1 2 3 4	NOTIFIED
	x	37	Annealing furnace	2	J-110	16423	1 2 3 4	1 2 3 4	NOTIFIED
	x	37	Annealing furnace	3	K-110	16587	1 2 3 4	1 2 3 4	NOTIFIED

Courtesy: Belden Manufacturing Company

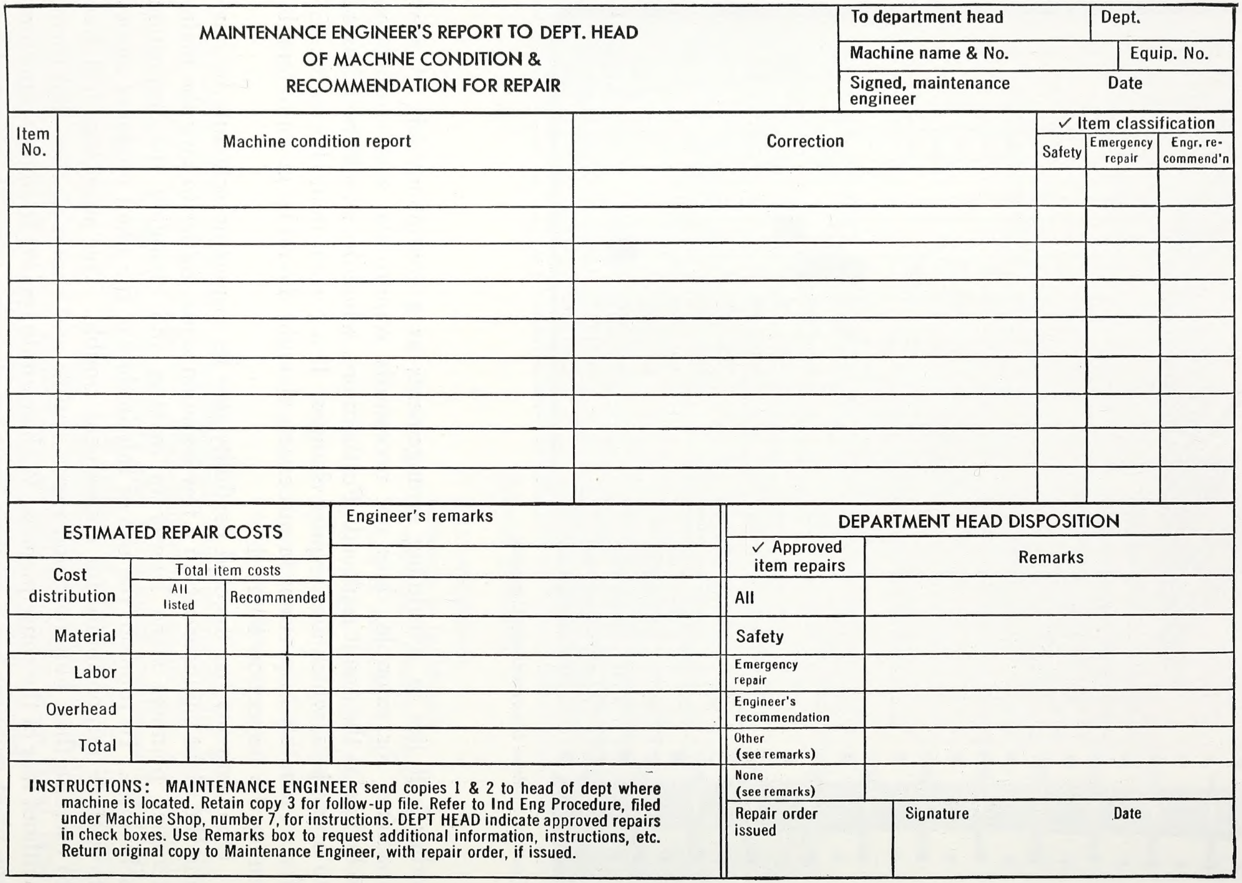
other half lies in scheduling arrangements as a continuous job. A new machine, for example, does not necessarily require the same inspection schedule as the one it replaced. Furthermore, schedules should be adjusted to operations, which also require changes. If a certain item checks "O. K." for six monthly inspections in succession, thought should be given to lengthening the inspection interval.

One company has injected flexibility into its inspection schedule by having the plant engineer set up a few common sense guides to give the maintenance planners some leeway in making and changing the inspection schedules. To promote the use of this initiative, the plant engineer agrees to assume responsibility for consequent trouble. The inspectors feel free to exercise their judgment and report results and causes as they find them, without fear of the consequences. With accurate reports from the inspectors, the plant engineer has a realistic basis for changing some of the schedules, with effective inspection at reduced costs.

For inspections to be effective, records should be made of the findings,

FIGURE 14.2

Maintenance Engineer's Report



MAINTENANCE ENGINEER'S REPORT TO DEPT. HEAD
OF MACHINE CONDITION &
RECOMMENDATION FOR REPAIR

To department head
Dept.
Machine name & No.
Equip. No.
Signed, maintenance engineer
Date

Item No.	Machine condition report	Correction	✓ Item classification		
			Safety	Emergency repair	Engr. re-commend'n

ESTIMATED REPAIR COSTS

Cost distribution	Total item costs	
	All listed	Recommended
Material		
Labor		
Overhead		
Total		

Engineer's remarks

DEPARTMENT HEAD DISPOSITION

✓ Approved item repairs	Remarks
All	
Safety	
Emergency repair	
Engineer's recommendation	
Other (see remarks)	
None (see remarks)	

Repair order issued	Signature	Date

INSTRUCTIONS: MAINTENANCE ENGINEER send copies 1 & 2 to head of dept where machine is located. Retain copy 3 for follow-up file. Refer to Ind Eng Procedure, filed under Machine Shop, number 7, for instructions. **DEPT HEAD** indicate approved repairs in check boxes. Use Remarks box to request additional information, instructions, etc. Return original copy to Maintenance Engineer, with repair order, if issued.

Courtesy: Belden Manufacturing Company

including the cause of the trouble and recommendations for correcting it. The cumulative inspection record tells a definite story about the machine, and sometimes about its operator. It may also suggest a change in the frequency of inspections. This record procedure is the most practical scheme for correcting inspection intervals originally determined by engineering skill.

The work order

Preventive inspection determines the condition of the equipment, suggests how an adverse condition should be remedied, reports the probable cost and the relative importance of a possible breakdown. The inspector's recommendations are reviewed by the plant manager if the costs run over a fixed amount — from $50 to $150 as a rule. Below the maximum, the inspection engineer is allowed to order the work done on his own initiative. In some plants, work costing less than $50 may be requested by the foreman and performed by the plant or departmental mechanic. Work orders costing more than the maximum allowed the inspection engineer must have the approval of the plant manager. Relatively large expenditures, such as machine renewals, invariably go to top management for approval. Figure 14.2 is a typical maintenance engineer's report. It records the faults of the machine, makes recommendations for correcting them, states whether safety or an emergency is involved, and gives the estimated cost of the repairs.

Besides the periodic inspection procedure and the resulting report with recommendations for corrective action, maintenance must include a system of control to see that the approved action has been carried out, and how its actual cost compares with the engineer's estimate. When inspection check lists are used, they are actually the primary control for inspection details. Inspectors' reports employ various symbols of colored check marks and crosses, to indicate such conditions as "satisfactory," "adjustment needed," "poor condition but no immediate repairs," "emergency" and the like.

Lubrication

Proper machine lubrication is naturally an important part of preventive maintenance, since many machine failures are due to faulty oiling. The problem is threefold — what lubricant to use, where to use it, and how often. The large oil companies try to find scientific answers to these three questions and they use their findings to aid their present customers and to attract new ones. The plan is a salesmanship device, but, at the same time, to be successful it has to come up with the right answers.

For small concerns, the oil companies are ready to make lubrication surveys of machinery and equipment for the purpose of recommending the proper oils and greases for machine parts, and for setting up lubrication schedules. The simple plan provides a sticker for the machine, noting the kind of lubricant or grease to be used, where it is to be applied, and how often, with parallel columns for "when" and "done," and the operator's initials. When the concern is large enough to employ lubrication specialists, it prefers to make its own analyses and thus feel freer in the choice of lubricants. Whether the lubrication is done by a group of maintenance workers or by the machine operators, an initialed record fixes responsibility for failures.

The Organization of Maintenance

The importance of maintenance in the organizational hierarchy depends on the nature of the business, but in any event it is determined by top management. Even when it is important in the production processes, management often relegates the supervision of maintenance to some minor executive. Worse than that is the tendency to select third-rate supervisors for maintenance while hiring first-rate men for production. The cost of maintenance is always greater with a poorly organized and poorly staffed crew.

An organization chart for maintenance is necessary for fixing authority and responsibility, but it is only an aid in getting the work done well and at low cost. Simply making a diagram of the functions that have to be performed will not guarantee an efficient maintenance organization: the proper men have to be assigned to the designated functions. Another error to be avoided in drawing up an organization chart for maintenance is the tendency merely to copy a chart used by some other concern. Organizational principles have general validity, but they always have to be applied to specific and unique situations.

Line and Staff. A good maintenance organization will provide for line-and-staff management. The chief, whether he is plant or maintenance engineer, should report to some member of top management in a large production concern. In some companies where the service rendered is close and intricate, the maintenance department should have equal standing with the production organization. Engineers and draftsmen, acting in a staff capacity, can well serve in building, electrical and other special maintenance functions. In fact, electrical maintenance problems have become so complex that some companies contract for their care by outside specialists. This practice can be followed generally by small concerns which cannot afford to employ maintenance staff men. Specialization has become the trend in maintaining the increasingly complex equipment of modern industry.

Clerical Work and Training. There are two maintenance auxiliary services which deserve better treatment than they are getting from most companies. One is clerical help and the other is the stockroom for parts, tools and supplies. It is an inexcusable management mistake to have clerical work done by the maintenance operators in the average-sized organization. Trained clerks will do the work better and at less cost, besides relieving operators for their specialties. This observation applies to such routine matters as cost and equipment records, work orders, dispatching and reports for executive control.

Training is another obvious requirement in maintenance work. Actually, many of the recognized crafts also need special training when they join a maintenance crew.

The Stockroom. The maintenance stockroom has a direct effect on the department's efficiency. Its purposes are maintaining an adequate stock, good records and quick service. Adequacy of stock means having on hand what is needed; substitutes are unsatisfactory. Good records keep inventory at a workable level without unnecessary costs, minimize waste and aid in accurate costing. Quick service saves the wages of idle workers, both productive and maintenance, by speeding maintenance jobs. Good storeroom methods, facilities, and a sufficient number of service employees are necessary to accomplish maximum results.

It is desirable to have the maintenance dispatcher plan to have storeroom tools, parts, materials, and supplies delivered directly to maintenance jobs. This practice saves the time of skilled workers who could move from one scheduled job to another without the necessity of wasting time on trips to the stockroom. Another time-saving stockroom idea is to provide projecting rotary bins of small items so that workers can help themselves to parts and supplies of insignificant value. In some places, craftsmen are allowed to withdraw from the stockroom on their own signatures, and have their requisitions reviewed at the end of the day or job.

The Dispatcher. The dispatcher's work in a large maintenance organization is similar to that of the production dispatcher, but occasionally more important with respect to the number of operations he is responsible for initiating. He receives orders for repairs from the operating departments and from maintenance. He sees that the accounting requirements and necessary approvals are in proper shape. He checks the completion dates, and in some cases does the scheduling. He keeps a complete record of the maintenance load on the maintenance control chart. Finally, he assigns the maintenance jobs, receives time tickets from which he prepares reports for the payroll department, and closes out the completed jobs by filling out the proper forms and moving the job from the control board. With these duties, the dispatcher becomes the key work-horse for the control of maintenance operations.

Communication. It is just as necessary to have the organization chart displayed as it is to draft it. Besides promoting coordination, it is good psychology. Members of the entire organization can see that they belong, where they fit in, and the extent of their duties and responsibilities. Without the planned coordination which comes from posted charts, the will for cooperation does not carry far in the right direction. One maintenance engineer cites a case where an oiler was fired because he was overdoing his job. Later it developed that he was having the unsolicited help of two machine operators who were really causing the machine trouble by their gratuitous lubricating activities.

Centralization versus Decentralization. The question of centralized or decentralized maintenance is another organizational problem. Both plans have sturdy supporters. The group favoring centralization contends that it reduces operating costs, particularly in spread-out plants, makes possible better inventory control of parts and supplies, and improves coordination and inspection. The other side contends that departments have special problems which can be solved better by locally assigned operators, and at less expense. It is suggested that where these conditions exist, it is better to centralize the maintenance of problems common to all the departments, and decentralize those problems peculiar to individual departments.

A final observation regarding maintenance organization is the advisability of separating planning and performance. In an organization large enough to warrant this treatment, better work will be done at lower cost.

Maintenance Policies

It is important to establish company policies for all phases of operations, and maintenance is no exception. So that maintenance policies will fit in with general company policies, they should be formulated by top management, with the cooperation of departmental supervisors. In most cases, maintenance policies are believed to be "understood," so they are not written down. But guiding policies should not be left to chance: unwritten "understandings" soon become misunderstandings.

In formulating maintenance policies it is well to start with a check list of the fundamentals to be accomplished. The alternative is to copy the policies of another concern, and this is a mistake because policies should express individual company objectives. They should be tailor-made. Some of the outstanding questions for determining company policies deal with such matters as the place of maintenance in the organization, the allocation of charges for repairs and replacements, and the plan of accounting for new facilities.

When should repairs be charged to the capital account? How should the cost of replacement parts be treated? Should repairs be kept down so that replacement will be more frequent? When should replacements be charged to operating costs? What should be the basis for estimating machine and construction depreciation? Possibly there should be one plan of depreciation for company bookkeeping and another for tax purposes. The answer depends on the degree of conservatism practiced by the company. These are only a few of the many questions which should be answered in the maintenance department's policy manual. Another important policy concerns the standardization of machines and equipment for the purpose of reducing parts inventories. Where policies are fixed at the top-management level, they should be made flexible enough to promote the initiative of those who enforce them. Finally, they should be made known to everyone in the maintenance organization.

Maintenance Management

The first step in the management of maintenance is the planning, scheduling and dispatching of the workload. The schedule adopted for preventive maintenance is the first step in this direction. All maintenance work cannot be planned, but when most of it is, the difficulty in taking care of emergencies is proportionately decreased. Preventive maintenance can be planned on a long-term schedule. All except emergency maintenance can be planned on a weekly or daily basis, and most of the maintenance crew should know their assignments the day before, at the latest. Emergency problems can be taken care of by drawing crew members from routine jobs where they can be spared.

As far as possible, maintenance work should be done without interfering with regular operations or production. When this is not possible, some workers are being paid for idle time. It is often possible to do preventive work on machines when they are normally idle. Some maintenance work can be done at night in plants having a one-shift operation. When plants shut down for vacation periods, over-all maintenance jobs have a clear field.

Another production-saving idea is to have duplicates of important equipment for installation while regular pieces are being serviced. The faulty machine can be taken to the maintenance shop where a better, faster and cheaper job can often be done. One company has its glass furnaces on rails so that they can be transferred to a central relining station and another towed into operating position over the same rail.

Standard practice instructions should be provided for the installation and maintenance of all major pieces of equipment. The maintenance department should always be on the lookout for possible improvements in methods both in its own work and for production in general. In repairing a machine, the maintenance worker can often see ways in which improvements in design or operation will reduce both maintenance and production costs. Such suggestions can then be incorporated in the standard practice instructions.

Cost estimates for maintenance aid in controlling the work. When the estimates show a wide variance from the actual costs, management has a right to question the reason. This procedure spurs maintenance to improve its methods and make a closer study of its operations and expenses. Careful cost estimates are indispensable to a satisfactory crew job, and, furthermore, the crew will have a sense of personal satisfaction when it meets or beats the estimate. Time estimates are an important phase of costs; for control purposes they should be broken down for all crafts working on a job.

Approval of the maintenance chief should be obtained for scheduling rush jobs. In this way, the chief will be responsible for investigating every call upon maintenance, and those departments demanding unnecessary preferential treatment can be kept in line. It is also good practice to schedule in advance only those jobs which have fixed completion dates. Under this procedure, other jobs of a nonemergency character can be performed during dull periods, thus promoting a more even workload. No maintenance job should be scheduled until the dispatcher is assured that the special tools and materials are available. A final suggestion for maintenance planning is the daily conference of maintenance supervisors for the purpose of revising schedules and discussing new problems.

Cost savers

Maintenance should always be alert to possible ways of cutting down operating expenses, both in its own department and in the departments which it services. It has already been mentioned that scientific determination of stockroom inventories will save the company money by reducing the amount of idle time spent by both production and maintenance workers waiting for a missing tool or other piece of equipment.

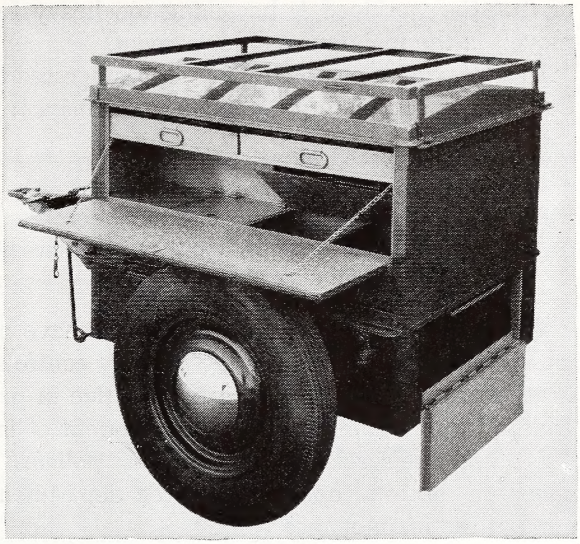
The decision whether to make or to buy a given item should receive more careful attention. For example, one company reports that its maintenance department made two hundred wooden dowels at a cost of $64 when these could have been bought from an outside firm for $4. The writer was given a cabinet-shop price of $7 for a telephone stand that cost maintenance $14 to construct; furthermore, maintenance turned out a stand that could have supported a piano; not only was all that weight unnecessary for a telephone but, more serious, it was too heavy to be moved around! Maintenance departments all too frequently make this error of producing themselves things that can be bought more cheaply on the outside.

Another practice by which maintenance can cut costs is the standardization of procedures, tools, repair parts and supplies. In the matter of lubricants alone, most departments are using twice as many varieties as necessary. In the course of their work in the various production departments, maintenance workers should keep their eyes open for other situations where standardization will save money; many such situations exist.

Maintenance should further be on the alert for possible improvements in equipment. In fact, top management and production workers should actively seek out the advice of maintenance. In one factory where such advice was sought out and then implemented in action, an improved outside lighting installation cut maintenance costs by 75 per cent. A large inside white paint job was sprayed for half the cost of doing the job by brush and, because spraying uses more paint, the light reflection was greatly increased, thus improving working conditions.

FIGURE 14.3

Mobile Maintenance Shop



Courtesy: McCabe-Powers Auto Body Company

Another way of cutting job times and thereby cutting costs is to have the tools, spare parts and supplies that are used most often always ready to haul to the job. This can be accomplished by maintenance pushcarts for inside jobs and trailers for outside work. Figure 14.3 illustrates this type of mobile shop. For large maintenance installations separate trailers are available for the various trades, specially built and equipped for their purposes.

The Texas Engineering and Mining Company has installed overhead track-hung platforms for airplane maintenance, making it possible to do floor and overhead work simultaneously. The Packard Motor Car Company reports that its maintenance alarm system has "minimized conveyor downtime in case of failures, because maintenance men are now on the job to make repairs six times faster than before." This system is operated from call boxes throughout the plant.[3]

Controls

Maintenance requires a job schedule and control board similar to those used in production.[4] The control board shows the over-all picture of what is going on, and furnishes a primary control for seeing that assignments are completed on schedule. The chief of maintenance should have summary progress reports on all jobs at stated intervals, preferably weekly, for control purposes. Investigation of holdups may show that the crews need prodding, or that the workload is becoming too heavy for the number of men employed in the maintenance department.

---

[3] For an interesting list of maintenance savings, with illustrations, see "Maintenance Proffers Fertile Field for Operating and Production Economies," *Purchasing,* Vol. 28 (June 1950), pp. 189–201.

[4] See Figure 15.3, p. 297.

In approving a completed job, it is suggested that the following questions be asked to stimulate progressive maintenance:

> Have you replaced all safety guards?
> What was the cause of the repair?
> What do you suggest to prevent recurrence?
> What changes in methods, tools or materials would you make if you were doing this job all over again? [5]

Work authorization and cost estimates have been discussed. Along with job specifications, they form the primary controls. The maintenance budget is an over-all control that can be effective in provoking thoughtful consideration by the maintenance superintendent of important jobs that must be done, and their relation to company policies. The budget is a natural check on the total operations of the department, and a test of its knowledge of the maintenance work.

Incentive pay

Until recent years the suggestion of incentive pay for maintenance workers was considered absurd. Incentive payments are based on standard times, which were considered impossible in any kind of maintenance work. It was contended that the job had to be "taken down," or analyzed step by step, before anyone could determine what had to be done, or how long it would take to do it. Furthermore, maintenance employees usually work in small groups, often only two, so it does not pay to supervise them closely. So ran the argument. In other words, maintenance work simply did not lend itself to the ordinary controls.

Gradually some companies started to establish standard times for repetitive jobs, paying incentives to workers who beat the standard. Where the plan worked, it saved supervision, but it obviously required inspection to see that the job was done correctly.

Many companies have found it possible to standardize the length of time required for various janitorial duties and are thus able to employ a system of wage incentives for janitorial work. At the Lockheed Aircraft Corporation in Burbank, California, for example, detailed standard times for all janitorial work have been in operation for several years. The standard data "are sufficiently complete to permit establishing an accurate time standard for complex janitorial activities in any given area by adding the standard data times for all the job elements involved in keeping that area clean."

Lubrication is another maintenance field where standard times and incentive bonuses are being established by companies large enough to employ lubrication crews. The basis of incentive lubrication is a master record, ordinarily broken down by department, showing the location of each machine, lubrication sequence numbers, frequency of lubrication, description of the lubrication points and the type of lubricant to be used. Allowance must be made for the times when it is necessary to shut down the machine for safety. With lubrication needs scheduled, a fair standard of work for an eight-hour day can be determined. When the work accomplished exceeds the standard day's work, the worker is paid for his extra accomplishment at the hourly rate. Inspection of incentive lubrication can ordinarily be done satisfactorily by spot checking.

---

[5] Carl G. Wyder, "Keep Your Plant Up, Keep Your Costs Down," *Factory Management and Maintenance,* Vol. 108 (January 1950), p. 62.

Planned lubrication performed on an incentive basis has been satisfactory because it means higher pay and a better distributed workload for the crew, lower lubrication costs for the company, and better results from the equipment. Under this system, the oilers are more interested in reporting lubricating troubles in their territory for the simple reason that they may be held responsible for later operating faults.

Slowly but surely, standard times and incentive pay are being established for many repetitive maintenance jobs. This is especially true on such jobs as the repairing of window sashes, leaky toilets and door locks, and the care of grounds. Besides reducing the cost of maintenance, standard times make better planning and scheduling possible.

Conclusions

Management is learning from its own experience and from the example of more progressive concerns the relative value of the function that maintenance can perform in the total organizational structure. As a result these functions are being continually expanded and refined. As this new recognition grows, maintenance will gradually cease to be a "blind spot" in the vision of top management, and the application of scientific principles to maintenance procedures will be of profit to the whole organization.

Maintenance is not only closely related to productivity but to safety as well. It is obvious that when machines and equipment are in proper working order they are a better safety risk. Well-painted workplaces reduce accident hazards by improving the direct and indirect vision of the workers. Properly protected and serviced wires and pipes promote safety. This subject will be dealt with in detail in Chapter 23 on Health and Safety.

Important items for future attention in the maintenance field are time and process standards, better planning and scheduling for its long-term activities, and improved controls. The maintenance budget tends to furnish poorer controls than those for most other departments. When maintenance wants to make a "favorable" budgetary impression, it cuts expenditure estimates below a practical minimum. The result is that while maintenance costs go down, production costs go up. A proper system of accounting will show realistic maintenance costs before budgets are finally adopted, and those costs should be used to guard against maintenance's predilection to submit budgetary boasts to management. Another way to inject realism into the maintenance budget is to require that it show estimates for each operating department separately.

A few simple rules will help management improve the maintenance function:

1. Establish a record of all items that require maintenance, and note their condition periodically.
2. Maintain a work-order system that permits adequate control.
3. Schedule lubrication on a standard-time basis, and then make spot inspections.
4. Plan a full day's work for each mechanic, and postpone the less essential work in favor of emergency jobs.
5. Record all costs by job order and each piece of equipment worked on.
6. Plan stockroom inventory on the basis of experience, and make changes dictated by new experiences.
7. Pay wages and salaries that will attract the most competent workers: cheap workers are expensive on the maintenance crew.
8. Arouse and maintain top-management interest through reports which give facts and which interpret them, especially from the standpoint of costs and potential savings.

QUESTIONS

1. Why is it that maintenance has been considered one of the chief "blind spots" of industry?
2. How do you feel about the inclusion of housekeeping activities and operation of the power plant among the duties of maintenance? What is the basis for your decision?
3. What is the approximate relation of indirect to direct cost of maintenance? What are some of the important indirect costs of inadequate maintenance?
4. How much should a good maintenance program cost in relation to direct labor? Can a preventive program be made so elaborate that it costs more than it saves?
5. What records are necessary for planning a scientific maintenance program?
6. How are inspections related to preventive maintenance? How would you determine a proper inspection program, especially with reference to the time element?
7. What plan would you suggest for developing initiative on the part of maintenance inspectors?
8. How can a check list be used in connection with maintenance inspections?
9. What are the three chief aspects of the lubrication problem in its relation to maintenance?
10. What items should be included in the maintenance engineer's report on a requested machine inspection by some line supervisor?
11. How can incentive wages be geared to maintenance work? Can your plan be applied to all maintenance work? If not, what are the exceptions, and what are your criteria for selection?

12. What factors should determine the setup of the maintenance organization, and how can they be applied for reaching decisions?
13. Should maintenance have a separate stockroom? If you think so, enumerate the arguments you would use to convince top management.
14. Should the maintenance function be centralized or decentralized? If you feel that its supervision should be split, explain how and on what basis. How would your decision to decentralize affect control?
15. When should repairs be charged to the capital account?
16. What is a good policy with respect to accounting for maintenance? Defend your plan.
17. How can planning, scheduling and dispatching be applied to the management of maintenance?
18. When should maintenance work be done to minimize interference with production? In this connection, how would you set up control for rush maintenance jobs?
19. How can standardization be promoted in the maintenance service function?
20. What suggestions can you contribute to the savings of maintenance costs?

CASE PROBLEM

Lucas Boat Builders

The Lucas Boat Builders produce various types of pleasure craft, some of the smaller sizes being made for stock during the slow production periods. Boats costing over $1000 are all custom made to individual orders. The company also builds a standard marine engine in three small sizes. Engines for the larger craft are bought, ready to install. The company employes 760, the majority of whom are skilled mechanics.

Lucas has been catering to the southeastern pleasure-boat demands for twenty-five years, and making excellent profits, especially on its custom-built boats. The business started in the small-boat line, which it still sells through wholesale sporting-goods channels. During the first ten years of its history, the company was compelled to specialize on this type of craft because of the large capital requirements demanded by the longer construction periods of the more expensive boats.

With its machine tools for making engines, a complete line of wood-working machinery, and the expensive special equipment used in boat-building, the company has about one million dollars invested in its machinery and equipment account.

There is no fixed policy governing the replacement or addition of machinery. Standard equipment is replaced when the engineering department agrees with a foreman or shop superintendent that the cost of maintaining and operating it are becoming prohibitive. New types of machines are purchased as additions and substitutes whenever engineering's written analysis demonstrates the need for them or the savings to be effected. The company does not have a specific allowance for machines and equipment in its budget but charges the cost of such items to the several depreciation reserves provided for that purpose.

The maintenance department reports to engineering, which sets up the paper records for its guidance. Foremen can request maintenance to make repairs to machines when the cost is estimated to be less than $25. Actual costs are checked against the foremen's estimates by the engineering department. Repairs costing from $25 to $250 are requested by one of the superintendents of the twelve "shops," and ordered done by engineering after a substantiating survey. Amounts over $250, which usually involve replacements, are submitted to the vice-president in charge of production.

Repair and maintenance costs are kept on a "shop" basis and reported to the accounting department in separate amounts for labor and materials. Maintenance is accounted for on a "shop" basis because the shop superintendents work on an incentive system which considers standard operating costs as part of the formula.

During the past year, the vice-president of production has been complaining about maintenance costs. The chief engineer blames the superintendent of maintenance, who contends that his authority is so curtailed by engineering that he cannot install the procedures which he has repeatedly recommended to his chief. The latter claims that the maintenance superintendent is not cooperative and makes no effort to improve his work or reduce its costs.

The maintenance superintendent prepared a written report of complaints and recommendations for his superior, the chief of engineering, and sent a copy to the vice-president in charge of production. It summarizes the situation as follows:

1. Ninety per cent of the engineering department's orders for repairs are marked "rush," making it practically impossible for maintenance to schedule its own work.
2. Engineering does not cooperate in allowing maintenance to keep on hand a reasonable supply of stock parts.
3. Engineering maintains supervision of machine lubrication, but does not exercise proper controls, thereby creating unnecessary maintenance costs.
4. Most of the machine downtime could be avoided by having one each of six different standard machines for replacements while repairs are being made.
5. Foremen should have authority to order repairs up to $50, thereby saving downtime and repair costs.
6. Individual records should be kept on most of the machines as an aid in deciding what makes to buy for replacements.
7. Foremen should be given monthly records showing the exact cost of keeping their various machines in repair.
8. Maintenance should have a budget allowance for labor and material expense, so that it has an official target to work toward.
9. Maintenance should report to the vice-president in charge of production, and be given an opportunity to work out the procedures for its operations without daily interference in details.

PROBLEM. If you were vice-president of the Lucas concern, what would you do to solve the maintenance problem? Would it make any difference to you that the maintenance superintendent did not send his report to the vice-president through the channel of the engineering department? If you were assuming control of the maintenance department, as vice-president of production, what instructions would you give the maintenance superintendent in view of his recommendations?

CHAPTER 15

Managerial Planning

When the word "plan" entered the English language in the seventeenth century, it had a highly specific meaning. It is derived from the Latin *planus,* meaning "flat," and is etymologically the same word as "plane." The first known use of the word in English (1678) was to describe a drawing or sketch made by projecting an object on a plane surface. In other words, it was something like a "blueprint." From this highly specific meaning, the word gradually came to be used more loosely until, today, in popular speech, it means any decision to behave in a particular way. ("Are you going to the ball game?" "No, I hadn't planned to.") When the word is used as vaguely as this, it is difficult to think of any action that is not in some sense planned.

It might be said that the field of management is currently reversing this historical trend. For, from its newer and broader meaning, planning in business and industry is returning to the specific kind of drawing or sketch that it started out to be three centuries ago. But with this difference: planning is no longer merely a sketch of objects, but of men and their actions as well. This latest trend toward ever more detail in planning is apparent at every level of management, but — as we shall see — it is above all the area of production which most approximates the original meaning of the word.

The first function

As the first of the five functions of management, planning naturally precedes organizing, directing, coordinating and controlling. Without planning, for example, the concern's organization would be useless for all practical purposes. Leading the other management functions, planning is intensely thought-consuming because it must choose among alternative objectives, policies and programs, as well as the methods, procedures and techniques for making the plan effective. In choosing among these alternatives, the planners must constantly fix their sights on the company's main objective and basic supporting policies. In fact, the formulation of most plans employs the typical scientific methodology, including:

1. Determination of the objective
2. Selection of data pertinent to the problem
3. Analyzing the possible courses of action
4. Synthesizing the results in a conclusion
5. Evolving a plan to obtain the solution
6. Trying out the plan in action
7. Making changes suggested by the trial

When it is done well, planning influences the other four functions toward a unified goal — the chief objective. Not only is the organization built around a master plan, but the main purpose of directing or managing is to make that plan materialize. Coordination is the function of balancing and synthesizing human efforts, to accomplish unified operations in furtherance of specific plans. Finally, the purpose of controlling is to insure that established plans and procedures are carried out, that standards are met, and that situations "get back under control" when they go astray. Controls would scarcely be necessary, or even feasible, without some form of planning. Although all management levels must share to some extent in the planning process, the top level has to assume the principal decision-making role.

Importance of planning

Denial of the necessity for planning ignores the fact that a business always, in some respect, is facing a choice among alternatives. When the need for planning is denied, action is based on chance or emergencies. If the factors that influence business were static, it might be possible to stumble onto a line of chance actions that would yield a profit. But business is so highly dynamic that occasionally some of the alternatives are ignored through ignorance. Depression and war are two drastic examples. There are many lesser shifts in the dynamic field of business that can be warded off or minimized by planning. With change the long-accepted certainty, it is clear that only planning can blunt the sharp edge of style changes, for example, thereby reducing their economic shocks.

Planning is also necessary in adjusting the parts to the service of the whole. A large department store discontinued paying bonuses, based on volume of business, to its departmental buyers after at least twenty years of this common practice. It was decided that the new straight-salary plan would increase the interest of the firm's buyers in the store as a whole, without jeopardizing their individual departmental interest.

Above all else, planning is the over-all economic phase of management. It saves operating costs and reduces the business shocks of a continually shifting economy.

The Economics of Planning

Economics has been defined as the science that treats of the production and management of public wealth, the distribution of goods, and the satisfaction of human needs. Formerly, economists were concerned chiefly with the welfare of the state. As machine-made goods took an active part in the economic picture, the individual assumed a more important role, and the philosophical economists started to expand the sphere of "management" accordingly. Later, the new business management became independent to the extent of developing its own philosophy of principles, which emphasized the breakdown of skills and their coordination in production and other lines of business. It should also be noted that the business manager gives more attention to human *wants* rather than *needs,* which are a prime interest of the economist.

Recent management literature indicates a new consciousness of the principles of economics by business leaders.[1] They are paying more attention to "economic studies" as the basis for planning. In other words, planning is one of the functions which is stimulating management's attention to economics.

The planning period

One phase of planning economics is determination of the planning period for various business programs. For what period of time should the operating *budget* run? Some budgets are planned for two years, but the common practice is for one year. Realizing the possibility of sudden economic changes, a small percentage of budget-makers plan their budget estimates on a semiannual or quarterly basis. Further protection against rapid changes can be provided by monthly reviews of the budget.

The improvement budget, on the other hand, may be planned over a long term, usually five to ten years. However, some managers feel that the recent rapid changes in many of the fundamentals of business operations make even the five-year improvement budget unsound. Undoubtedly, the operating period of any kind of budget must be based on economic conditions and their susceptibility to change.

Machinery replacement is frequently a problem, especially when the present machines are still profitable and not obsolete. The solution is difficult when the improved model has distinct advantages. Since it is impossible to predict when further improvements in design may be on the market, an important economic question is: how long will it take the new machine to pay for itself? A predictable period, based on an economic study, often decides the question.

Enlargement of buildings, such as an office building, plant, warehouse or hotel, presents the same type of problem, including a choice of alternatives.

Broad economic planning is also used in large corporation investments. Industrial research represents one of these unusual risks, but essentially the problem it poses is based on the probable recovery of the capital investment. The difficulty of comprehensive planning in connection with capital investments is again illustrated in the necessity for keeping in mind the master plan while planning the reasonable insurance for return of the investment. "Although the desirability of each individual capital expenditure should be tested by its prospective earnings, it must also be tested for consistency with the master plan. The probability that a given investment will produce the predicted profits depends in part on how it fits into the company's pattern for long-term development."[2] It should also be recognized that there is often a relation between short- and long-term investment plans. For superior results, the two must be coordinated as fully as possible.

---

[1] Two examples: Joel Dean, *Managerial Economics* (New York: Prentice-Hall, Inc., 1951) and Walter Rautenstrauch and Raymond Villers, *The Economics of Industrial Management* (New York: Funk & Wagnalls Company in association with Modern Industry Magazine, 1949).

The national economy

The close relation between the national economy and managerial planning is emphasized in the divergent policies toward company expansion adopted since World War II by Montgomery Ward and Sears Roebuck. Montgomery Ward adopted a strict policy of inventory and store retrenchment, based on the historical decline of prices that have followed our wars. Sears Roebuck, because of the factor of pent-up civilian demand for goods after wars, followed the opposite policy of extending inventories and opening more stores. Both concerns had available the same facts; they emphasized different data affecting the same national economic situation. So far Sears' analysis has been better. But there will be a change — there always has been; the question is, When?

Marginal analysis is another economic planning tool of management. Any concern is operating at the margin when its revenues equal its costs. More and more companies are making use of the break-even chart to determine the marginal point in their operations, for economic planning.

Forecasts

Planning is based on forecasts. Forecasts, in turn, are based on both internal and external data; the latter are more involved and less predictable. They include general business conditions, which may in turn be affected by political and social changes. The labor, materials and capital markets are external conditions affecting planning for the individual enterprise. Internal company data used for planning include present and anticipated sales, nature of equipment, managerial personnel, credit facilities and others of similar nature.

In selecting data on which to base a forecast, the nature of the problem must be considered. Lack of discrimination in the selection process may do more harm than good. Indiscriminate collection of facts is not only impractical, but it may serve actually to confuse the issue.

As with budgeting, forecasting is valuable training for management. Both processes require high-level thinking on subjects that support decisions and

[2] Joel Dean, *op. cit.*, p. 456.

actions. Both promote consideration and discussion of business problems in their entirety, based on essential data. Forecasting compels planning on a rational rather than an emotional basis. To that extent, it promotes controls as an avenue to desirable change, and coordination for effective group efforts.

The *business cycle* must be given serious consideration in forecasting. Study of past business cycles has revealed certain key factors that must be watched for as indicators of general movements in the economy as a whole. Some of the most important of these factors are wholesale price trends, size of inventories, and the total amount of credit spending and speculation.

When it is known, on the basis of forecasting, that a decline in sales is probable, management can then swing into action. The action will vary. If the forecast indicates that the decline will be general in the industry, management may plan to curtail production. On the other hand, if the predicted decline is expected to be more limited in scope, the proper corrective measures may be additional advertising and more intensive sales methods.

Some events that will have a marked repercussion on business cannot be forecast with any degree of accuracy. Strikes, new government regulations, new inventions, wars — all of these are only more or less foreseeable. Nevertheless, a management which is attuned to the value of looking ahead will develop alternative emergency plans to deal with such contingencies.

Types and Levels of Planning

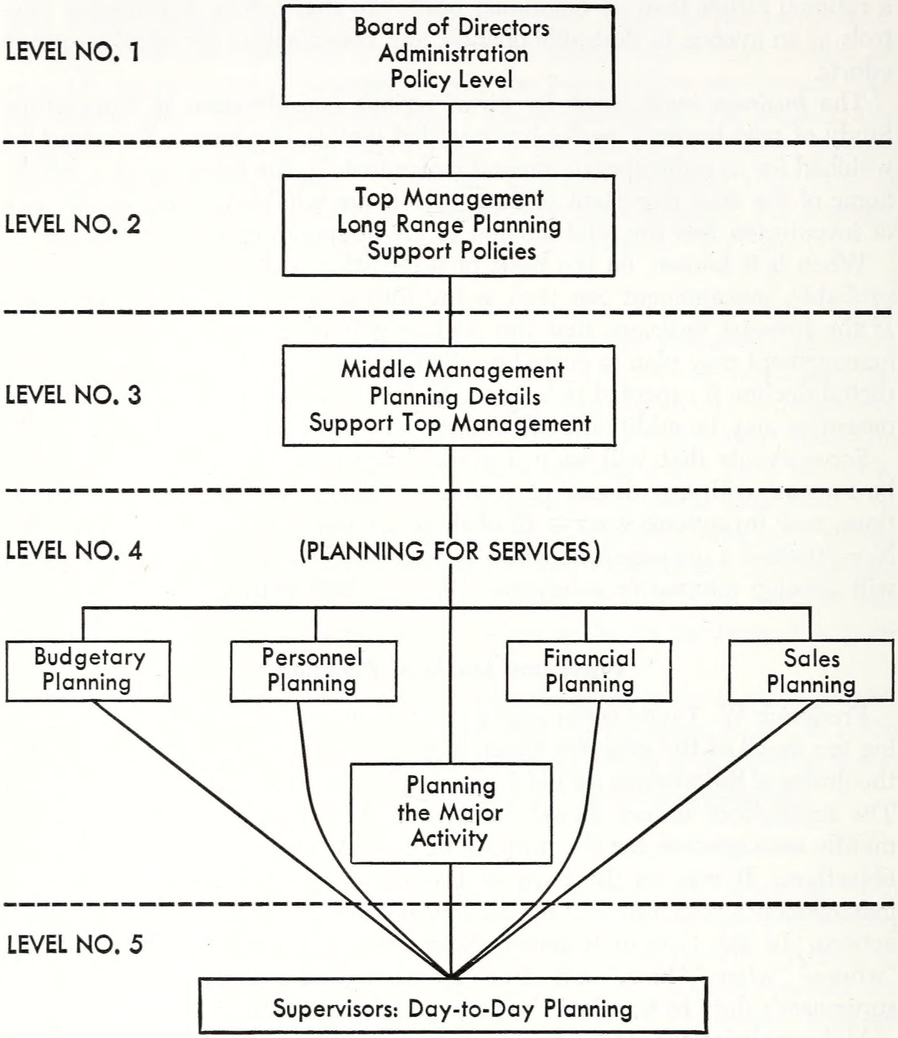
Frederick W. Taylor often emphasized management's dereliction in leaving too much of the planning function to the workers. He rightly held that the duties of the workers should be guided by the orders of their supervisors. The supervisors' orders should, in turn, be based on plans formulated by middle management for the purpose of carrying out company policies and objectives. It was on the basis of this reasoning that Taylor insisted on management's responsibility for making definite plans for guiding workers' actions. In any type of business, these working plans specify the "what," "where," "when," "how," and often "by whom," of any given job. It is the supervisor's duty to translate the managerial plans into worker action.

Major policies should be formulated at the top of the hierarchy by the administration. The purpose of all policies, in the long run, is to serve as assurance that company objectives will be accomplished. The broad steps presented up to this point are, in essence, the types and levels of planning. Let us examine these steps more closely, to understand better what types of authority and responsibility are involved at each of the planning levels, and how these levels are related to one another. Figure 15.1 can serve as a focus for this discussion.

All planning starts with company objectives. The fundamental problem is to devise ways and means for accomplishing the objectives. If the concern is small enough to be managed by a single individual, the entire plan-

FIGURE 15.1

Levels of Planning


LEVEL NO. 1
Board of Directors
Administration
Policy Level
LEVEL NO. 2
Top Management
Long Range Planning
Support Policies
LEVEL NO. 3
Middle Management
Planning Details
Support Top Management
LEVEL NO. 4
(PLANNING FOR SERVICES)
Budgetary Planning
Personnel Planning
Financial Planning
Sales Planning
Planning the Major Activity
LEVEL NO. 5
Supervisors: Day-to-Day Planning

ning burden is centralized on that person. Not only must he make plans for accomplishing the objectives, but he has the further problem of seeing that the plans are successfully carried out. In large enterprises, which usually adopt the corporate form of organization, the board of directors determine long-range plans for accomplishing the objectives which were formulated at the time of organization. The board is also responsible for necessary or advisable changes in the objectives. On this first level (see Figure 15.1), the fundamental plans for attaining objectives are often known as policies. The board of directors, as trustee for the stockholders, exercises over-all management responsibility to make the policies or plans which they feel will result in success for the enterprise. This top policy-making level is known as the administration, and its policy-making powers are called administrative, in distinction to the second level, whose powers are managerial.

The top managerial level is responsible for carrying out the policies formulated and announced by the board of directors. Top management makes the underlying and long-range plans for giving effect to the board's policies. This does not mean that lower levels of management cannot also make shorter-range plans for this same purpose. As a matter of fact, that is one of their functions, but the planning undertaken on the third level is more concerned with details, many of which will be sent down the line of command in the form of orders.

Just as the management group on the third level contributes to the concern's general planning, so does top management often contribute to the policy-making of the board of directors. Although top management has no authority to formulate high-level policies, it is in close touch with the board, and often influences top policies by the advice it offers at board meetings. In actual practice, the president of the concern usually acts as chairman of the board, as well as general manager of company affairs. In this dual capacity, he naturally influences top policies and coordinates board policies with management action, for which he is directly responsible.

As chairman of the board, the president shares with the other board members the responsibility for top policy-making; as president and general manager he is personally responsible to the board for the results of his managerial planning. He is likewise responsible to the board for the minor policies he formulates for operation of the enterprise. In fact, it is sometimes difficult to distinguish between the president's self-made minor policies and his major plans for carrying them out. However, his policies are of a more specific nature than those of the board, and form the basis for his long-range planning.

Middle management, listed on the chart as Level 3, is responsible to the president (top management) for planning on this lower level. The planning details on this level are designed to support and give effect to top management's planning. It should be observed that this third level is oversimplified on the chart. It often comprises three or more levels in a large organization. These sub-levels are sometimes known as upper and lower middle management. No matter how many levels appear in middle management, their planning functions should always be graded in proportion to their authority and responsibility. The executives on this third level also make recommendations for plans and minor policies to top management. On all levels, management planning recommendations go up the line of authority, while management orders based on plans originating at the various levels are sent down the line.

It should also be noted that any of the managerial levels may be assisted in their planning by one or more staff members. This phase of managerial planning is not shown on the chart because the line, or management, officers must assume the responsiblity for whatever planning ideas they receive from their staffs, if those plans are put into practice. In other words, the line or managerial officers are responsible for the success or failure of plans formulated by their staffs.

The fourth level of the chart is composed of service functions. These services, especially engineering when it is included, often do more planning than any of the upper levels, but their plans are cast on a lower and operating level. At the same time, their plans are circumscribed by both policies of the board and top management, and plans of all the higher levels. This group issues most of the orders going directly to supervisors. On this level, the chart emphasizes "Planning the Major Activity" which will be discussed in the following section.

The supervisors comprise the fifth level. It is their job to translate all plans and orders from above into detailed instructions for the guidance of the worker level, which is not accounted for on the chart for the simple reason that it does no managerial planning. This was Taylor's idea — that management levels should do all the planning while the workers performed the actual operations. By the time management's plans have reached the worker level, they should be laid out in all details necessary for deciding "what," "where," "when," "how," and "by whom."

There is one other important detail concerning planning types and levels. The chief of each level and functional service, and each supervisor, is responsible for planning the coordination of his subordinates' activities. When planning defines, as it should, the authority, responsibility and relationships of the various jobs in the management group, the difficulty of coordination is considerably reduced. Top management is responsible for coordinating the work of the entire organization. Coordination is naturally more difficult as responsibilities increase on the way up the scalar chain.

Finally, some qualifying explanations should be made regarding Figure 15.1 and the managerial planning levels to which it refers.

1. For small enterprises, many of the managerial levels will be collapsed. Some businesses may be so small that all of the planning responsibility must be carried on by one person.
2. The chart is oversimplified, especially on the third and fourth levels. Important services such as maintenance, central stores, and engineering could be included on the fourth level.
3. Besides the possibility of staff planning, there might be both permanent and *ad hoc* planning groups on the third level.

Planning the major activity

Planning the major activity refers to the more detailed and special planning necessary for guiding and operating the principal work of an enterprise.

Warehousing, for example, is the major activity of a warehousing concern, construction is the major activity of a building firm, and production is the major activity of a manufacturing company.

We shall refer, in this section, to five instances of planning the major activity in as many different kinds of business, largely to exemplify the need for mapping out in advance the path for obtaining company objectives. As rapidly changing economic, political and social conditions are added to competitors' alertness, the necessity for dynamic and scientific planning becomes ever more apparent.

Four of the following business examples will be discussed briefly due to the similarity of their planning fundamentals. Production planning, however, will be treated at length as a major topic because of the widespread application of its principles to other lines of business, and because of the planning techniques which industry has developed.

Planning is essential for all forms of business enterprise as well as for farming, construction, office work, and numerous other activities. The chief task of many government agencies is planning.

Construction of large buildings intrigues sidewalk observers by the seemingly haphazard manner in which the various mechanics and laborers are intent on independent jobs. Actually, every foreseeable detail of the largest construction job can be planned in advance of operations. The architect's drawings, blueprints and specifications are the physical evidence of synchronized planning, including instructions about what materials, workers and equipment are to be where and when, and how the work is to be done. If the detailed operation times were not known in advance, the contractor could not be sure of his costs, nor could the owner depend on the promised completion date. The subcontracting plumbers and electricians would not know when to start their part of the work.

To eliminate these doubts and the resulting confusion, the path or sequence of the operations (routing) is planned in advance. Detailed and sequential timing (scheduling) is necessary for coordination of operations and the prevention of construction bottlenecks. And finally, someone must be charged with the responsibility (dispatching) for seeing that the routing and scheduling of materials, equipment and manpower are carried out according to plans. Planning takes care of bottlenecks before they occur. Construction planning is the reason for the sidewalk observer's interest in watching apparent confusion develop into planned harmony.

Department stores also make use of the planning techniques of routing, scheduling and dispatching. To increase sales, the layout of departments is carefully planned with attractive items near the entrances. The routing of merchandise to sales centers is planned to avoid interference with customers and crossing other lines of traffic. Introduction of new styles, special sales, and incoming and outgoing deliveries are all carefully scheduled. The directing or dispatching of the store's numerous operations is, again, a carefully planned procedure for harmonizing relations among employees and coordinating their activities.

Wholesale and mail-order businesses use standard times for scheduling operations, for costing and for developing incentive-pay plans for some of their employees. Standard times are not set until the operations for which they serve as norms have been broken down into the best possible sequence. The layout of wholesale warehouses is planned for the most effective handling of goods from the standpoints of cost and maneuverability.

Service enterprises, such as laundries, must do careful planning for profitable results. Routing and scheduling of their work is vitally important to secure the most effective sequence and speed in operations. Many insurance companies use routing and scheduling techniques at their home offices to improve and control "production." An increasing number of service concerns are turning to scientifically determined standard operation times as the basis for establishing a balanced flow of paper work, as well as for fixing a "fair day's workload" for various operations.

Transportation agencies, such as railroads, steamship and air lines, are outstanding users of planned routing, scheduling and dispatching. In fact, these terms are in everyday use by such concerns.

Production Planning

As has been suggested, production planning, as the fifth and last example of major-activity planning, will be considered at length because of the contributions it has made to planning in most other lines of business, as will be pointed out during the discussion.

What is production planning?

Production planning may be defined as *the technique of foreseeing, and plotting in advance, all the steps in a series of operations in a manner that assures their accomplishment.*

To attain its goal, production planning predetermines *what* the work shall consist of, *how* it shall be accomplished, *where* it shall be performed, *who* shall do it and *when* it shall be completed. The answers to these questions involve an analysis of the task (what), definite and complete instructions (how), the path of operations required to perform the task (where), the time sequence of operations, including a breakdown into standard operation times (when) and, frequently, the operator (who), as the basis for determining the completion date.

To make production planning the accurate instrument that it is today, three important techniques had to be developed: (1) *routing*, the plotting in advance of the path or spatial sequence of operations; (2) *scheduling*, the plotting of a detailed time-table for operations; and (3) *dispatching*, the task of seeing that the routing and scheduling of materials, equipment and manpower are carried out according to plan. All three of these techniques will be treated in detail in the next chapter. Closely related to the technique of scheduling, which deals with the time sequence of operations, are *methods and time study,* which will be discussed in Chapter 17. Because control is, by definition, the process of assuring that performance corresponds with plans, it is difficult to separate planning and control in different chapters. However, there have to be plans before there can be controls and this chapter emphasizes the planning phase.

The need for production planning

The need for production planning as a separate activity and often as a separate department of any large manufacturing concern is more than anything else a result of the division of labor. In fact, it would not be inaccurate to speak of production planning as itself the "mental division" of labor, since planning is fundamentally a mental process. The more a total production process is broken down into separate operations, all of which are mutually interdependent in making the finished product, the greater the need for bringing together the planning of these operations in one central place and the greater the need for the kind of charting techniques that have been developed by production planning.

Under mass production, with its highly specialized breakdown of skills, the operator may be cutting steel stripbars on motor-driven shears with fixed guides and according to the instructions of a job ticket handed to him by his foreman. He has no idea what the pieces he is cutting will be used for, nor does he know where the steel strips came from. They are delivered to his machine with a "move ticket," and the pieces he cuts are taken away by a trucker to another operation about which he knows nothing. It is obvious that when this situation is multiplied many times throughout the plant, work-in-process must be coming to and leaving many operations simultaneously. If chaos is not to result, there must be some plan underlying all these movements. And if the plan is not in the individual workmen's minds, it must be in the minds — and on the records and charts — of a group of persons specifically charged with planning responsibility.

Thus, the rise of production planning as a separate activity has been a historical response to the growing division of labor. The rapid expansion and growing technicalities of industrial production led to increasing confusion and bottlenecks, requiring an enormous amount of expensive troubleshooting and expediting. The techniques of production planning were designed to reduce this expediting expense. Without production planning and control in large plants, the resulting confusion leads to high costs, undependable quality and delayed deliveries.

Factors affecting the need for production planning

There are four principal factors which make the adoption of scientific production-planning techniques necessary:

1. The complexity of modern production
2. The need to determine definite completion times

3. The need for coordination of all elements affecting costs
4. The need for flexibility because of process changes

The intensification of the problems of coordination because of the highly developed specialization of labor has already been discussed. The predetermination of the time required for the production cycle is important because the production cycle frequently has a direct relation to customer demand; if demand is miscalculated, inventory may pile up and equipment stand idle. The greater the coordination that can be effected among men, materials and machines, the less the amount of downtime for workers and machines — and, of course, the lower the costs. Finally, the need for flexibility is an important reason for systematic planning; the planning personnel must prepare for cyclical and seasonal fluctuations in demand for both production and consumer goods.

The planning of what, where, when, how and by whom is the best known method for getting production results. Production at the lowest possible cost requires the maximum utilization of men, machines and materials. The use of these three elements, in conjunction with the planning factors just mentioned, makes satisfied customers because of a fair price and delivery on time, and satisfied management because of low costs, minimum inventories and a smoothly operating organization.

Stages of mechanization

Production planning and control vary in range and difficulty with the degree and type of mechanization involved. The evolution of mechanization may be classified in six stages.

1. Hand operation is mechanized only by the hand tools of the mechanic and might better be referred to as *pre*mechanization.

2. The next stage uses a simple mechanized hand tool, such as the power saw or single drill.

3. Next follows the power-machine tool performing two or more similar operations simultaneously, such as the multiple drill.

4. The fourth step in mechanization is represented by those power tools which perform different operations simultaneously. An example is the machine which performs different operations at various work stations built around a drum, to which the materials are fed automatically, simultaneously and progressively. (Figure 15.2 illustrates this type of machine; it performs eight different operations simultaneously.)

5. The next development in mechanization is the coordination of a group of automatic machines geared to operate as a single mechanism.

6. Finally, we are now operating electronically controlled machines, singly and in groups.

The future of mechanization, already described and pictured in futuramic magazines, envisages the electronically controlled plant, or “automation.”

It is the two extremes — the hand operation and electronically controlled

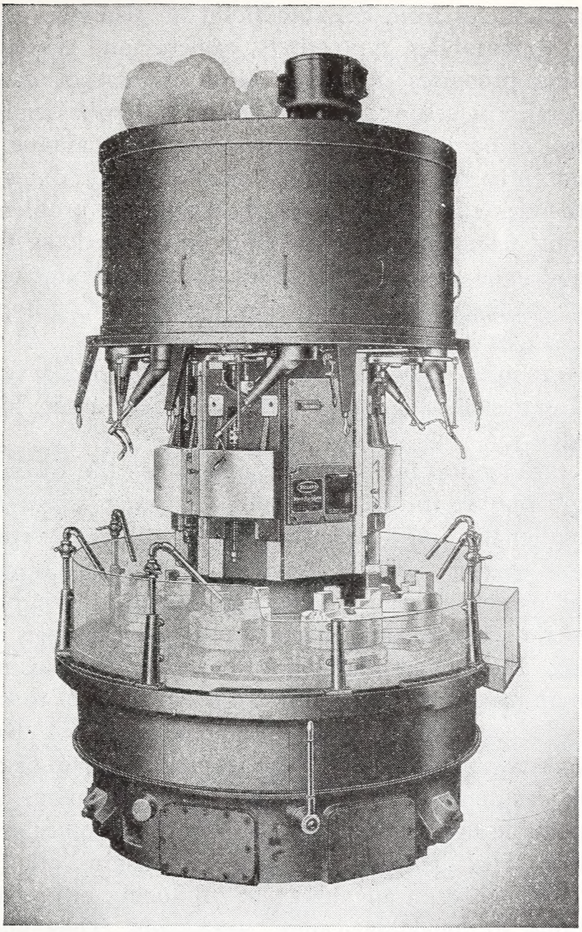


FIGURE 15.2

The Mult-Au-Matic

Courtesy: The Bullard Company

operation — that require the minimum of production control. Whereas the hand operation also requires a minimum of planning, the electronically controlled plant of the future will test initial planning to the utmost, even though in operation it will run smoothly until a mechanical defect develops. In between these two operating extremes lies the great bulk of modern production processing, and this must be planned and controlled by management in great detail.

Types of manufacturing

Planning techniques in the field of production depend to a large extent on the type of manufacturing involved. There are various ways in which types of production may be classified. Two of the outstanding classifications will be discussed. One has to do with the "stock or order" distinction, and the other with "continuous or intermittent" processes.

Stock versus order production. Manufacturing for *stock* offers many advantages from the standpoint of planning, especially in the production of automobiles, typewriters, cameras and similar lines. While these planning processes involve a large amount of data-gathering, research and details in setting up assemblies and subassemblies, the subsequent control of operations is relatively simple. Planning for stock production does not involve scheduling to meet delivery dates of customer orders, and thereby eliminates one of the persistent problems in other kinds of planning. Also, material handling is reduced, as is the cost of direct labor and some services. One disadvantage of producing for stock is the possibility of making goods which may be difficult or impossible to sell because of changes in style and habit among buyers. When this situation develops, large sums may be tied up in slow-moving inventories and storage space. These expenses must be added to any credit loss resulting from pressure sales.

Production for *customer orders* has the distinct advantage of following the market in both demand and price. Even though the price may be higher than on items produced for stock, nevertheless excessive inventories and storage facilities for finished goods are obviated. In other words, the pitfalls of uncertain markets are avoided. Ship building and the production of power plants and machine tools are examples of this type of manufacturing. Production planning for customer orders is naturally more complicated than production for stock. To avoid some of these complications, customer-order production is often planned on a "lot" basis, as is always the case in producing for stock. The lots are made up of two or more similar orders, to facilitate lower costs and easier planning. However, it is frequently possible to combine only portions of customer orders to make up workable lots. This naturally adds a further complication to planning.

The chief disadvantage of producing customer orders is their susceptibility to "peak-and-valley" workloads. They not only increase unit costs but make steady employment difficult. Because of this disadvantage it is becoming more usual to combine stock and customer orders. While this combination involves higher inventory investment, it has the advantage of holding together the working organization and facilitating production planning.

Continuous versus intermittent production. Continuous production is simply what the title implies. It is found in making shoes, cameras, and cement where the process is continuous from the raw materials to the finished product. Manufacturing of this type simplifies the planning process. Actually, planning for continuous production may well start with plant construction and layout. Because of its continuous nature, the "how" and "where" of planning are fixed by the layout of equipment. Only the "what" and the "when" are left for detailed consideration, and the "when" is made relatively simple if the equipment is properly arranged in balanced sequence.

The advantages of continuous production are the relatively few changes in equipment, high specialization of labor, minimized handling and reduction of the special services of indirect labor. The outstanding disadvantage is the possibility of obsolescence due to market changes. If the product requires any considerable change, some new equipment and a different layout are customarily necessary.

Intermittent production means that the plant is used to produce different parts or components, frequently from different materials. It may even cause the same department to produce different items on the same machine, necessitating changes in machine setup. The typical machine or tool shop represents this type of production. Advanced planning for intermittent production makes use of conveyors which can often be rearranged to take care of new operations for different items. This planning method may combine the continuous and intermittent types. It should be realized that production in a single plant is not necessarily either all continuous or all intermittent. Various departments may operate on one or the other plan. However, intermittent production requires more complicated planning than does the continuous method. Under any production plan, any increase in the number of assemblies and subassemblies, and in the number of parts and operations, complicates production planning.

Coordination of facilities

By facilities are meant machines and equipment, including those for material handling and storage. The planning agency must have detailed information about all facilities in order to coordinate their functioning in production. For example, the speeds and feeds of all machines must be known, as well as their numbers, sizes and locations. This information is necessary to determine the sequence of operations and the use of the material-handling equipment for coordinated internal transportation. Machine capacity will determine scheduling, and existing machine loads are always a consideration in determining the routing of orders. The degree to which products, operations and equipment are standardized also has a paramount influence on production planning.

Production planning requirements summary

The fundamental data required for efficient production planning are these:

1. *Production design:* blueprints showing the dimensions, tolerances, material specifications, assembly and subassembly layouts; parts lists.
2. *Machine data:* locations, type of work, speeds, feeds and availability.
3. *Tool data:* location and condition of all tools, dies, jigs and fixtures.
4. *Raw-material data:* material available for commitment in stores; purchase orders for materials not yet received; possible material substitutes on hand or available for purchase.
5. *Employee data:* breakdown into worker skills by shift and by department.

6. *Time standard data:* schedules and cost determinations; time is also a factor to be considered in maintenance and the correction of rejects.

Planning and Process Charts

That modern planning is bringing the word "plan" back closer to its original meaning of "a projection of something on a plane surface" can be seen from the number of home-made planning and control boards and charts in wide use among all kinds of businesses today.[3] The usual purpose of these boards and charts is to provide a picture of the plan for scheduling men, services, machines and equipment and to show to what extent actual operations are proceeding according to plan. They are also adapted to the planning and controlling of such activities as sales, procurement, personnel management and inventory control. In production, machine loadings, the distribution of partial orders by operations, and main and subassemblies are some of the elements which may be charted. Most of the boards are simply improved mechanical examples of planning methods made famous by Henry L. Gantt.

As progress charts, they are particularly valuable in comparing actual situations with planned schedules. Their information does not supplant records, but rather visualizes them in such a way that the recorded information is available at a glance, making them particularly valuable for the responsible members of management. In other words, they are graphical interpretations of the records.[4] Figure 15.3 shows a typical visual control board.

Process charts are used for planning and improving office and other procedures. There are several types of process charts, each fitted to the purpose it is to serve. Figure 15.4 illustrates the various kinds of process charts and the uses to which they can be put.[5]

Process charting is a method which has been used successfully in simplifying all kinds of management and office procedures. It can be used to save expense and man-hours in planning work for better and faster results. It has proved effective in eliminating bottlenecks and duplication of effort. "They can be used to point up problems in relationships and responsibility, and other major administrative problems."[6]

A process chart is a picture of procedures as they exist; it can be used to

---

[3] The Sched-U-Graph board of Remington Rand, the Produc-Trol board of the Wassell Corporation and the planning system of the Addressograph Company are examples of patented boards.

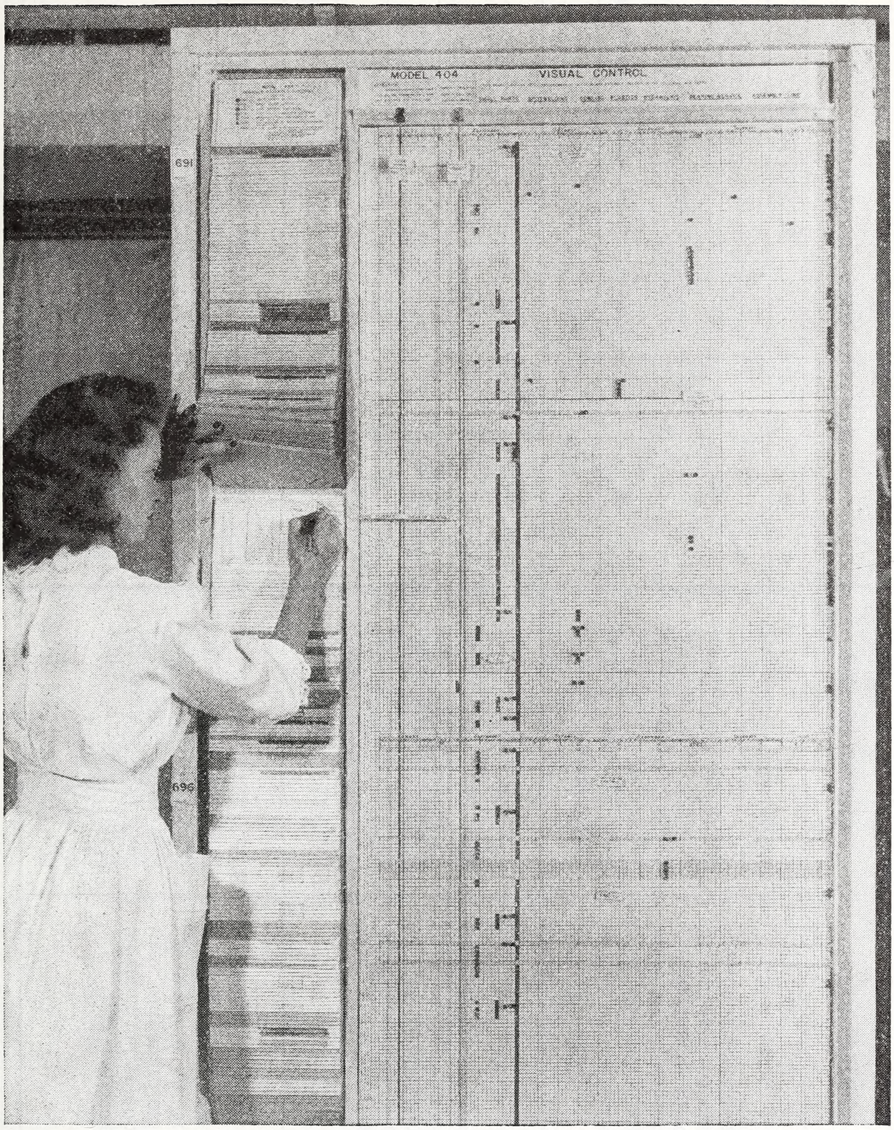
[4] One plant superintendent, referring to the use of control boards by his foreman, states: "Foremen now have the complete picture as they plan their work. They are better managers because they understand better what is to be done. We no longer use hot-lists to put pressure on them, yet we are getting better output per machine-hour and better deliveries." Quoted from a customer in Remington Rand literature.

[5] A clear and brief summary of *Process Charting* (U. S. Government Printing Office, 1945) is available for 55c.

[6] *Ibid.*, p. 2.

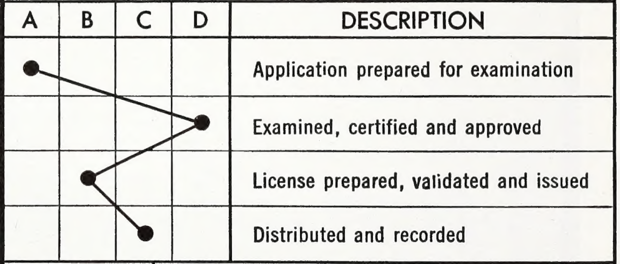
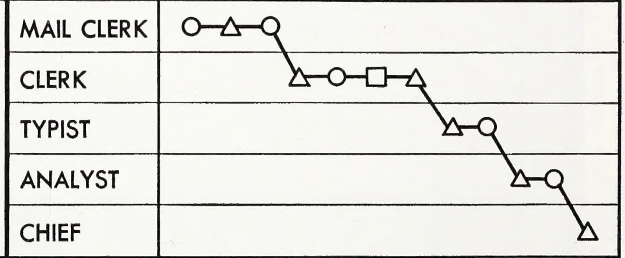
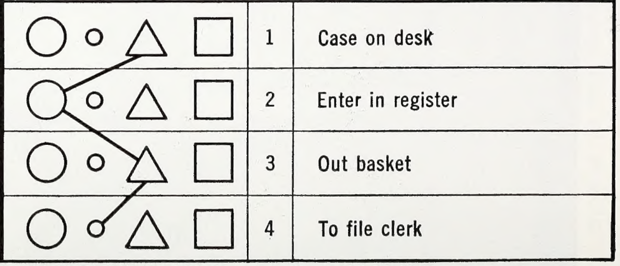
FIGURE 15.3

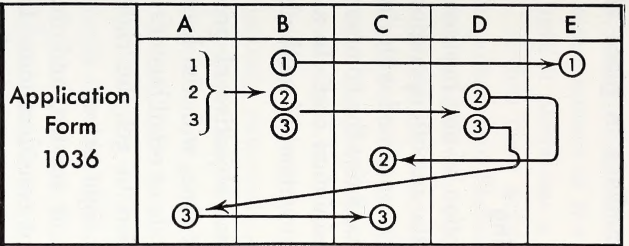
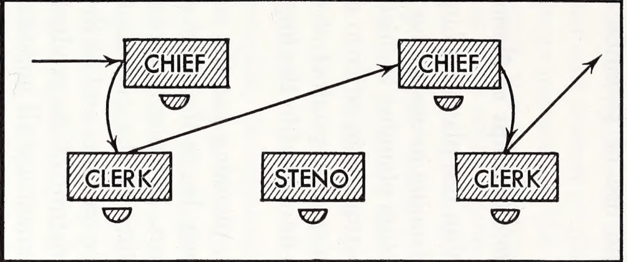
A Typical Visual Control Board



Courtesy: Glenn L. Martin Company

develop a parallel picture of proposed improvements. It is much easier to analyze procedures from static pictures than to study the dynamic operations, which accounts for the value of planning with the aid of process charts, in which standard symbols represent various items suited to the situation to be improved. Some of the savings resulting from the use of

OBJECTIVE	CHART TO USE	ILLUSTRATION OF CHART
To study the sequence of major operating steps in an activity and the organization units performing them.	WORK FLOW CHARTS give a general description of the steps in one column; other columns represent organization units. The connecting lines show the flow of work.	 A B C D DESCRIPTION Application prepared for examination Examined, certified and approved License prepared, validated and issued Distributed and recorded
To analyze the detailed steps in a flow of work that is quite complex or involves several organization units.	MULTI-COLUMN PROCESS CHARTS show steps in greater detail than on a work flow chart — symbols are used to describe steps.	 MAIL CLERK CLERK TYPIST ANALYST CHIEF
To study the detailed steps in a relatively simple procedure such as one within a single organization unit.	SINGLE-COLUMN PROCESS CHARTS are often drawn on printed forms; work flow is shown by connecting the appropriate symbols	 1 Case on desk 2 Enter in register 3 Out basket 4 To file clerk

To study the flow of copies of a multicopy form.	FORM DISTRIBUTION CHARTS show the number of copies in the first column. The flow of each copy of the form is traced from unit to unit.	
To improve the layout of the office so that unnecessary steps can be avoided.	LAYOUT FLOW CHARTS involve a diagram of the office made to scale — the flow from desk to desk is shown by arrows.	
To simplify the steps in an operation performed by one employee.	OPERATION CHARTS are of several types; the one shown in the next column is commonly used to study the motions of each hand.	**LEFT HAND** 1. Move to drawer 2. Pick up clip 3. Move clip to paper 4. Attach clip to paper **RIGHT HAND** 1. Move to paper 2. Pick up paper 3. Idle 4. Idle

Courtesy: U.S. Government Printing Office

FIGURE 15.4

Process-Chart Selector

process-chart analyses in many businesses are actually startling. The idea is simply another illustration of the use of scientific methods in place of hunches.

Organizational Relationships of Planning[7]

The degree of organization within the planning function of any business depends on the total amount of planning necessary for the smooth operation of dissimilar departments. Production planning is chiefly concerned with the smooth coordination of all its departments in order to maximize the common purpose of high productivity of a quality product at minimum cost. In all lines of business, planning is also interested in the improvement of methods and procedures.

In nonmanufacturing concerns, planning has the same objective of producing "results," whatever they may be, in the shortest time, with the least worker fatigue and at minimum cost. In either a wholesale or retail business, results are measured by the ability of the organization to get the right merchandise to the right customer on time, and at the right price.

The size of the concern, the nature of its product or service, and the planning attitudes of top management are all important considerations. In small companies, planning is of necessity a special function of the manager or owner, whether or not he recognizes it as such. In the large concern, the organizational status of planning depends largely on top management's opinion of its planning leaders.

How much of the planning function is concentrated at or near the top of the management group may be measured by top management's confidence in the planning ability of the succeeding levels of the hierarchy. Again, the importance of managerial planning may depend on the number and kind of other organized departments of the company. For example, Planning might have charge of methods and time study, the results of which are used in Production. If adequate cooperation is lacking, it is possible that the planning agency within Purchasing might extend its influence to Central Stores. Since all the elements of any business must dovetail for efficient operation, it is not uncommon for a department like Planning to achieve such good results through close association with other departments that the latter are eventually absorbed into the sphere of influence of the former. In this way, some masters of the art and science of planning may extend their influence until it permeates a large measure of the organization.

---

[7] A possible source of confusion to the student of management is the fact that a single word is often made to serve several purposes. Since this book is meant to acquaint the reader with current management practices, as well as with principles and problems, and since the people engaged in the day-to-day tasks of managing business and industry are in the habit of making a few words do the work of many, the student should become accustomed to the multiple references of simple words like "planning" and "control." In this and the following chapter various aspects of planning are discussed. Since all connotations of the word are going to be used in what follows, we shall adopt an arbitrary convention in order to prevent misunderstanding. Thus, when we speak of the process of planning, we shall simply use the word "planning." But when the reference is primarily to the *people* with organizational responsibility for planning, whether these people constitute a department or are grouped on a less formal basis, we shall capitalize "Planning."

As has been suggested, the type of business has a direct relation to the importance of Planning in its organization. For example, the planning function is relatively simple in continuous industries, and since its place in the organization is correspondingly unimportant, it may often maintain an independent status. In a job or order shop, the opposite situation will prevail. The importance of Planning under intermittent production will lie somewhere in between its status in continuous production and job shops. In large assembly industries, like automobile production, where planning becomes extremely complex, its organizational position is correspondingly important, and there is a consequent natural tendency to have its planning closely scrutinized far up the organization line.

It might be assumed from its title, for example, that Production Planning would report to the superintendent of Production. But there are valid arguments for and against such a relationship. Those opposed advance several claims. It is felt that if a manufacturing concern is large and its products diverse, its planning function will get better results if it reports to a member of top management rather than to the Production chief. It is also pointed out that the Production chief will tend to resent the implication included in any method or procedural changes suggested by Planning. Again, we fall back on the relative capacity and influence of the personalities involved.[8]

The Planning Department's organizational relationships will also be guided to some extent by the attitudes of those departments with which it must exercise closest cooperation in effecting its purposes. These associations may include any one or more of such departments as Sales, Stores, Purchasing, Standards, Maintenance, Inspection, Tools and Equipment, Shop Transportation, and Plant Layout. Figure 15.5 shows the position of Planning in a large department where the function is considered important. Under this setup, the Department of Planning & Controls will sometimes have a general supervisory check on plans made by other service departments located on Level 4 of the chart on page 286.

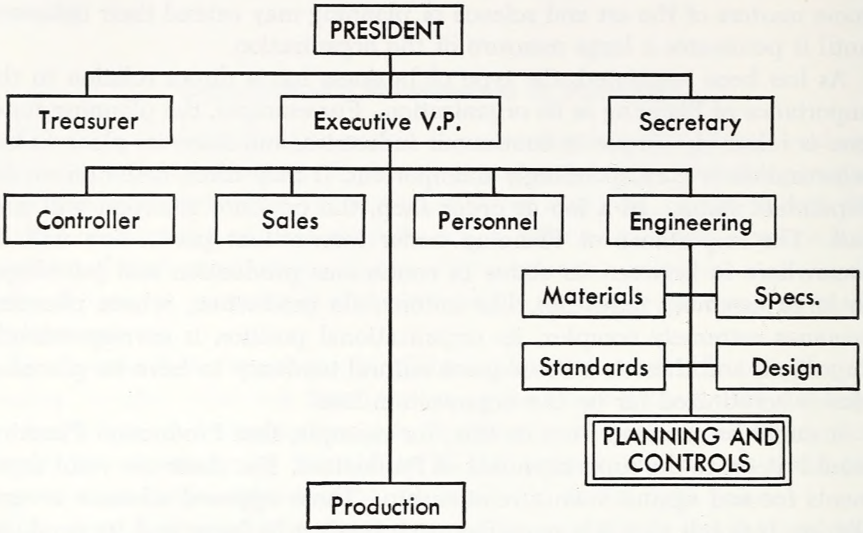
As a final note on the organizational relationships of Planning, it may be observed that top management may take a major interest in planning, assisted by a staff agency specializing on the subject. The desire for supervising functional coordination on a top level will be one of the factors leading in this direction. On the other hand, top management may have a penchant for dispersing planning for the purpose of promoting initiative down the managerial line. In such a solution, a centralized over-all staff agency may be set up for checking on the plans of the various departments

---

[8] There is a similar debate about whether Inspection should report to the Production chief. In this case, those opposed contend that Production would be in the position of passing on its own work.

FIGURE 15.5

The Planning Department's Position in a Large Organization



to see that they are coordinated with each other and with top plans and policies, which are presumably geared to company objectives.

Centralization of planning

Planning is customarily centralized in proportion to the number of departments involved, and the degree of their interdependence. At least this would be the theory. In practice, the procedure depends, again, largely on the attitude of management toward centralization in an Engineering or Planning Department. Where a number of different and important functions are included in an organization, there must be a reasonable degree of centralized planning in order to coordinate the departmental plans, and to minimize confusion and costs. In any large business involving different departments it is clear that there must be careful coordination of plans for all such functions as purchasing, selling, financing, personnel management and the scheduling of operations. Coordination of planning under such conditions is possible only under centralized supervision.

When planning is checked and coordinated at some central point, supervisors are relieved of details for which they are not always competent in a large concern. This is especially true when departmental plans must be synchronized with the broader plans and policies of top and middle management. Under such an arrangement, the supervisor's time is released for the instruction of workers, for answering their questions, and for maintaining coordinated operations within the departments. This type of staff relief for supervisors is desirable to the degree that it is needed for the proper performance of their line functions. It is simply another way of saying that planning should be centralized in direct proportion to the number and intricacy of the activities to be planned, and to a certain extent in inverse proportion to the capacities of the supervisors affected.

This generalization points to one of the *disadvantages* of centralized planning. It minimizes the responsibilities of supervisors. Whether this is serious depends on the circumstances and the men involved. Because responsibility helps to build good leaders, it is highly desirable for their own personal growth that supervisors should have to meet challenges. It is also well known that the experience of conquering difficult problems on the lower management levels occasionally brings out latent executive abilities.

Another serious disadvantage of highly centralized planning is its tendency to be unwieldy and inflexible. The higher up the source of planning, the less information is available about lower-level problems. Especially in emergency cases, such as the absence of a highly skilled person who figures prominently in the central planning agency, the advantages of having some dispersion of planning responsibility can be seen. Furthermore, the centralized agency can plan only for the foreseeable matters; supervisors with some degree of planning authority on the lower levels are in a position to handle unforeseen occurrences more expeditiously than can be done by an over-all staff agency.

Decentralized Planning. Planning at lower levels is particularly desirable in establishments with unrelated departments. The extent to which coordination among departments is unnecessary largely measures the opportunities for delegating considerable planning authority down to the supervisory level. The use of a machine for simple operations facilitates decentralized production planning. However, this opportunity is not so great as might be expected because of the typical requirement for two or more machines to complete a single operation. But even in such cases the foreman is ordinarily capable of taking care of spot planning, especially if his department is not tied too closely to some other from an operating standpoint.

Combination Planning. In actual practice some combination of centralized and decentralized planning is the rule. Plans which involve precise routing and scheduling among business or production departments will be drawn up by a central agency, while those planning details which can be cared for on the supervisory level, without interfering with the over-all plan, will be determined there. It is fair to conclude about this phase of the planning problem that the current tendency is to decentralize as much as possible, for reasons already suggested: decentralized planning promotes supervisor initiative and permits flexible and prompt decisions at the bottom of the organization ladder where the unexpected is most likely to happen.

Coordinating plans

All planning involves coordinating when it is confronted with dissimilar functions. In such cases, it must consider much more than knowledge of procedures and processes, however important they are to the whole picture. The planning agency must work closely with Sales, Engineering, Purchasing, Personnel and Internal Transportation. Sales estimates supply the basic information for many forms of planning. When Engineering supplies designs they often form the basis for planning. Since materials are frequently necessary, planners must know that they will be available when needed. This means that materials and supplies must either be on hand, or on order. In either case, Purchasing must cooperate with Engineering Design to learn the kinds of materials or items desired, and in cooperation with Sales and Planning find out the amounts to be purchased and when they will be needed.

Since manpower is necessary in all lines of business, those responsible for planning must find out from the Personnel Department what skills are available and in what numbers. Based on this information, arrangements must be made with Personnel to fill in worker gaps.

Internal transportation, or material handling, is another element of planning. It comprises such a large percentage of costs in some lines of business that it should be given consideration in plant layout. The costs involved often prohibit changes after the layout is already set. Production must, of course, cooperate closely with the Planning Department.

Finally, there is always the question of finance. It is not always possible to plan in the most practical manner because of the expense involved. Planning compromises are sometimes dictated by available cash or credit. This is the point where top management enters into over-all planning.

The Cost of Planning

The excessive cost of scientific planning techniques is frequently cited as an argument against using them. The same argument is advanced in opposition to motion study and many other of the newer techniques of management. Of course, any costs may be excessive when compared with the results obtained. When the costs of planning are greater than the benefits derived, they are certainly excessive, and something should be done about them. There is often a tendency among those in charge of a department to puff its importance, thereby creating a dangerous trend toward overorganization and unnecessary costs. Such an attitude may be intellectually honest, or it may result from a simon-pure attempt to "build an empire" with its attendant personal benefits.

The success of any type of planning can be measured to some extent. Some of the measures are customer satisfaction, adherence to delivery dates, unit costs, quality of product and services, and worker morale. Morale can scarcely be measured in dollars, but improvement in morale may be indicated by a decrease in official grievances, absences, layoffs for infractions of company rules, and work stoppages. In addition to these statistical criteria, there is an atmosphere which can be gauged by those in daily contact with the workers. It is axiomatic that if the planning activity seems to be causing deterioration in morale, or in any of the other factors just mentioned, then it should be revised.

Experience proves that scientific planning is always profitable in medium-sized and large concerns. The record is full of examples where most of the benefits to be expected from scientific planning have materialized in fruitful measure. It may well be, however, that some companies are too small to support the style of planning which they have been influenced to install. There are no positive criteria by which the size of an enterprise can be matched with the proper degree of planning. In the last analysis, common sense dictates the obvious benefits of proper planning in any type of endeavor.

Conclusions

Planning provides for the prearranged coordination of activities. The factors of production planning are primarily men, materials and machines. The aim of planning in any business is smooth operation and economical costs. The opposite of planning is the "hot-list" system which closes loopholes and bottlenecks by using on-the-spot expediters. The hot-list system is remedial; planning is preventive.

There is no patent system for planning or control in any type of business. Like any aid to the main effort, scientific planning must be patterned to serve the departments involved. When patented planning and control systems are not related to the conditions which they are supposed to serve, they can hurt both their buyer and their seller.[9]

Because of the possibilities for constructing mechanical puzzles from the many techniques in the planning field, there is a tendency to confuse intricacy with profundity. Simplicity and profundity are more closely related. The purpose of planning and controlling is to reduce confusion and save money. When savings are not realized, the fault is with the planner.

Overelaborate systems waste money in the cost of their maintenance and in increased unit costs. The latter waste arises largely from delays due to lack of coordination. The best plan is the simplest system that effects its purpose for the circumstances at hand, and is at the same time subject to control. To copy a system used successfully elsewhere is about as fallacious as buying a friend's shoes because he found them comfortable.

QUESTIONS

1. Of what significance is the historical development of the word plan?
2. What is the relation of planning to the other functions of management?

---

[9] This comment does not apply to planning and control boards which are adaptable to varied circumstances.

3. Discuss the importance of planning.
4. What is meant by the "Economics of Planning"?
5. Explain the relations between short- and long-term planning.
6. What is the value of the economic cycle to forecasting?
7. How can the scientific method be applied to forecasting?
8. What are the chief levels of planning in a large organization?
9. How is planning applied to building construction?
10. Discuss the need for production planning.
11. What are the three chief factors of production planning?
12. With what stage of mechanization are we just beginning to be concerned? Will its planning be simpler or more complex than the other stages?
13. Name five requirements of production planning.
14. How are process charts used in planning?
15. On what basis or bases should the location of planning be determined on the corporation organization chart?
16. Who should be in charge of planning in a small proprietorship?
17. What are the advantages and disadvantages of centralized planning?
18. What is the relation between planning and coordination?
19. Why is it not good policy to copy a planning system used successfully by some other concern in the same line of business?
20. When is the cost of planning too high?

CASE PROBLEM

THE GRENNELL CORPORATION

The Grennell Corporation manufactures sheet steel products to customers' orders. It makes a serious effort to use scientific procedures in all of its departments, and is constantly seeking to improve the planning methods in its central office, in its executive relationships and in production. The company is well established, has 650 employees, and about 400 customers, half of whom send it repeat orders. Its ability to secure repeat orders is advantageous because of the drawings, patterns and jigs involved in most of its processing. This advantage is especially true for such products as blades and casings, machine guards and similar items.

The trend of the business has been toward a multiplicity of relatively small orders. For some of its older customers, production runs of a thousand are still possible, but its expansion efforts of the past five years have greatly increased the number of new customers ordering an average of one hundred of a single item. When the order represents something new, detailed drawings are required, and often patterns as well, so that the selling price necessary to get the business on a competitive basis allows less than the normal profit. In such cases, the orders are solicited with the expectation that they will lead to repeats at the same price, with better profit margins. These expectations have not been realized to the extent anticipated.

About five years ago, Grennell had a firm of industrial engineers lay out its production processing. During the past two years, its net profits have decreased while its sales were increasing. The president of the company, who is a business college graduate with twenty-five years' experience, is not satisfied with the reason given by the concern's controller as increased labor and material costs. He has figures to show that the percentage increase of these items is about balanced by higher selling prices.

After conferring separately with the heads of his various departments, the president suspects that their production planning may be overorganized. The records show that the percentage of overhead to sales increased faster than the ratio of direct labor to sales after the process planning was completed by the industrial engineers. They told him to expect a cost increase due to the new controls and accompanying paper work, but assured him that the increase would be more than offset by the improved coordination of production activities, and the reduced cost of trouble-shooting. In spite of these assurances, the president feels that their current record-keeping, including detailed machine, tool, material and manpower data, is top-heavy. The present production procedures have been summarized by the Engineering Department as follows:

1. *General Office.* Sends mail and phone orders to the Sales Department.

2. *Sales Department.* Interprets and prepares orders in skeleton form for the Order Department.

3. *Order Department.* Writes up the orders for the Production Department, on the basis of information from Sales; assigns the proper company order number; posts the order in the Register; attaches memos and correspondence to the order; and sends it to the General Engineering Department.

4. *General Engineering Department.* Analyzes orders, and if they are repeats, drawings are obtained from the files. If the order is from a new customer, or a different order from an old customer, the Factory Engineering Department is advised about costs. Working drawings are prepared, as well as jigs, etc., after consultation with the Standards Department. Orders are issued and sent to the Tool-Making Department for jigs, and patterns when necessary. Prepares the production order; returns the original order and accompanying papers to the Order Department. Sends the production order and drawings to Material Control.

5. *Material Control.* Determines the availability of materials in Central Stores. If they are not available, an Obligation-of-Stock Order is prepared and sent to the Purchasing Department. Available stock is noted on the Production Order, which is sent, along with the drawings, to the Standards Department.

6. *Standards Department.* Secures specifications from the files if the order is a repeat; if it is not, new specifications are prepared. An Order Card is made up, to be put into the Order Envelope with the specifications, drawings and any other processing instructions, and sent to Production Control.

7. *Production Control.* Enters the Production Order on the Production Schedule, with recorded times for the various operations, and the final date for shipping. Determines the time for release of order to Production, based on availability of materials, machines, manpower and the promised delivery date, and sends it in the Order Envelope to the foreman of the first operation.

8. *Foreman.* Draws the necessary stock from Central Stores on authorization which Material Control has placed in the Order Envelope. Draws jigs and patterns from the Tool Room, also on authorization in the Envelope. Checks the operation setup, and assigns an operator to the job. Inspects the completed operation unless instructions in the Envelope call for checking by the Inspection Department. In the latter case, the inspector is sent for and the job held until

released by him as O.K. Signs the Production Card and prepares the Move Ticket to the foreman of the next operation. Sends the order, the materials, etc., to the next production department. Prepares Spoilage Report for Production Control, and a Move Ticket to the Salvage Department.

9. *Inspection Department.* From the last production operation, the order goes to Inspection for checking against the drawings and specifications. Acceptance or rejection, with reasons, is noted on the Order Card. Sends Order Envelope to the Standards Department, and the product, together with the Order Card, to Shipping.

10. *Shipping.* Checks quantities against the Production Order, and returns it to the General Office, marked for billing. Returns the Order Card to Production Control, and ships the order.

PROBLEM. Would you advise the president of the Grennell Corporation to simplify his production-planning procedures? If so, how would you revise them so as to reduce the cost of the production records and various procedural steps, and still be in a position to maintain adequate controls over processes, machines, materials and manpower?

CHAPTER 16

Planning Controls: Routing, Scheduling, Dispatching

Planning is only relatively useful unless its ideas, directions or orders can be controlled in operation, which means checked against the plan. Because routing, scheduling and dispatching are three techniques of planning which lend themselves to direct and accurate control, they are usually referred to as planning controls, and will be discussed as such. As mentioned in the previous chapter, they are being applied in most types of business. They have become standard practice in industrial production; they are depended upon for facilitating operations in the better managed wholesale and retail concerns; and even in large service enterprises, such as laundries, routing, scheduling and dispatching are used to facilitate operations and to control their actions in accordance with predetermined plans.

The major factors aiding control, most of which were mentioned or discussed in Chapter 15, on Planning, include:

1. Analysis of the product or service
2. Analysis of materials
3. Machine and equipment data
4. Routing operations
5. Scheduling operations
6. Dispatching
7. Standard times and methods
8. Inspection
9. Cost analysis

Obviously, the majority of these facilitating and controlling aids are applicable to any line of business. The more elements involved in any operation, the greater is the difficulty of controlling it. The need for a control system tends to increase, therefore, in proportion to the number of factors to be planned and coordinated.

Scope of Control. Because the operation of any departmental control system depends on the nature of the business and on the relations of the control system with other departments and with top management, there can be no stock plan for its procedures. The techniques for control must definitely fit into the formal and informal phases of the organization in which they are used. Production control, for example, bridges the gap between Sales and Manufacturing. In that capacity it is charged with setting up systems that insure the production of the right products in the right quantities and qualities within the time limits allowed, and in the most effective manner. At the same time, the control phase of planning is obliged to perform its service in an expeditious manner so that its work is neither irritating to over-all operations nor made unnecessarily expensive because of a mass of paper work or conflicts with other departments.

When we realize that the control activity comes between Sales and the General Office on the one hand, and the work-force (Production in industry) on the other, it becomes clear that the introduction of controls can lead to both vertical and horizontal problems in human relations. It is up to top management to provide written policies for the guidance of any Control Department, including its relations with all other departments with which it comes in contact.

Production Control. Production Control must have authority to set up schedules, economic lot sizes, inventory quantities, and routing of work. To effect a proper coordination of these duties, the control manager must have considerable authority over operations after everyone concerned has agreed to the applicable procedures. Obviously, all the functions undertaken by a Production Control Department would be performed by someone even if such a department did not exist. The purpose of centralizing some or all of the control activities is to relieve scattered personnel of that work, and to do a better job under a single supervisor. A central control organization is in a better position to coordinate any group of activities, and is continually studying related operations for the purpose of simplifying them by combining, eliminating, or changing their sequence.

Equipped with the skill and means for establishing and maintaining controls, the department can furnish top management with one of its most valuable tools — graphic reports of operations. These picture reports show, in easily understood form, the present and future situations with respect to deliveries, costs and many other factors.

Three primary controls

If single words were justifiable in distinguishing the three control techniques we are to consider, routing would refer to the *path* of operations through the factory, store, warehouse or office; scheduling would refer to the *timing* of operations; and dispatching to the release of planned orders, or *action*. More comprehensive explanations would be:

Routing is the procedure of plotting the *path to be followed through the plant, office, warehouse or store.* "Stores-issue forms" are prepared from route sheets, which show the original station and subsequent moves, the various operations and their sequence, and the places where inspections are to be made. The actual ordering of moves indicated on the route sheet is the function of the dispatching section of Planning.

Scheduling is the procedure of *plotting the order in time of the work to be done,* including instructions as to which one of a group of operations, customer orders, or production lots is to be undertaken first, and all subsequent moves until the job is completed. Scheduling includes instructions for the beginning and ending times of each operation. In production, the order of work and the time required for the various operations depend on what machines, tools, jigs, fixtures, materials and personnel are available. Needed materials are checked by the balance-of-stores clerks. When the items required from Stores are ready for issue, the dispatching section sends the releases, along with the order identification tag.

Dispatching is sometimes referred to as a clerical job, but it must be handled with a proper understanding of the entire planning system, operations and equipment. The dispatching section carries out the orders of the routing and scheduling sections of the Planning Department. For industry, it starts operations by sending its instructions to the production centers. It procures the stores-issues and identification tags, and sends them to Stores, which attaches them to the materials so that they follow through all production operations intact. Dispatching sends the move tickets to plant transportation, with instructions to move materials from Stores to production centers. It sees that orders are carried out with respect to drawings, tools and the instruction cards needed for the various operators. It notifies Inspection of the completion of jobs. It sends the time and inspection tickets to the Accounting Department for bonus and payroll purposes and for costing. Dispatching has the important additional job of deciding on deviations from routed or scheduled instructions in cases where unforeseen circumstances, such as machine breakdown, lack of materials, or absence of manpower, require changes. Since cursory explanations cannot measure the significance, or even the content of these three controls, we must look to their use in operations for a clearer understanding of their purposes. Whatever the type of business concerned, it is conclusive that routing, scheduling and dispatching are necessary for controlled planning.

Routing

The elements of routing, in their natural sequence, as applied primarily to industry, and in a more restricted sense to other businesses, can be summarized as follows: [1]

1. Analysis of the product to determine the possible ways or methods of making it.

---

[1] These elements are adapted in part from L. P. Alford and J. R. Bangs, *Production Handbook* (New York: The Ronald Press Company, 1948), p. 169.

2. Study of the various methods to determine the "one best way" under existing circumstances.
3. Assembling of complete data on available machines, equipment and tools useful for the job, to determine their capacity, and plan for requirements to establish balanced production.
4. Determining, on the basis of methods adopted, what type or kind of special equipment or machines can be used to advantage, and whether the advantage justifies their construction or purchase.
5. Deciding on machine speeds and feeds for the purpose of establishing maximum productivity and operation times.
6. Figuring operation times for the purpose of balancing production, or other activities, through proper routing. Over-all production time includes machine setup, average machine downtime, inspection and material handling.
7. Determining the sequence or route of operation.
8. Route sheets must be broken down into subassemblies so that all components will be available for synchronizing with the main assembly. This process is applied in department store and warehouse operation and in production.
9. Preparing work sheets for carrying out the routing details.
10. Working out plans so that routing fits into the operations of centralized or decentralized planning procedures already established.

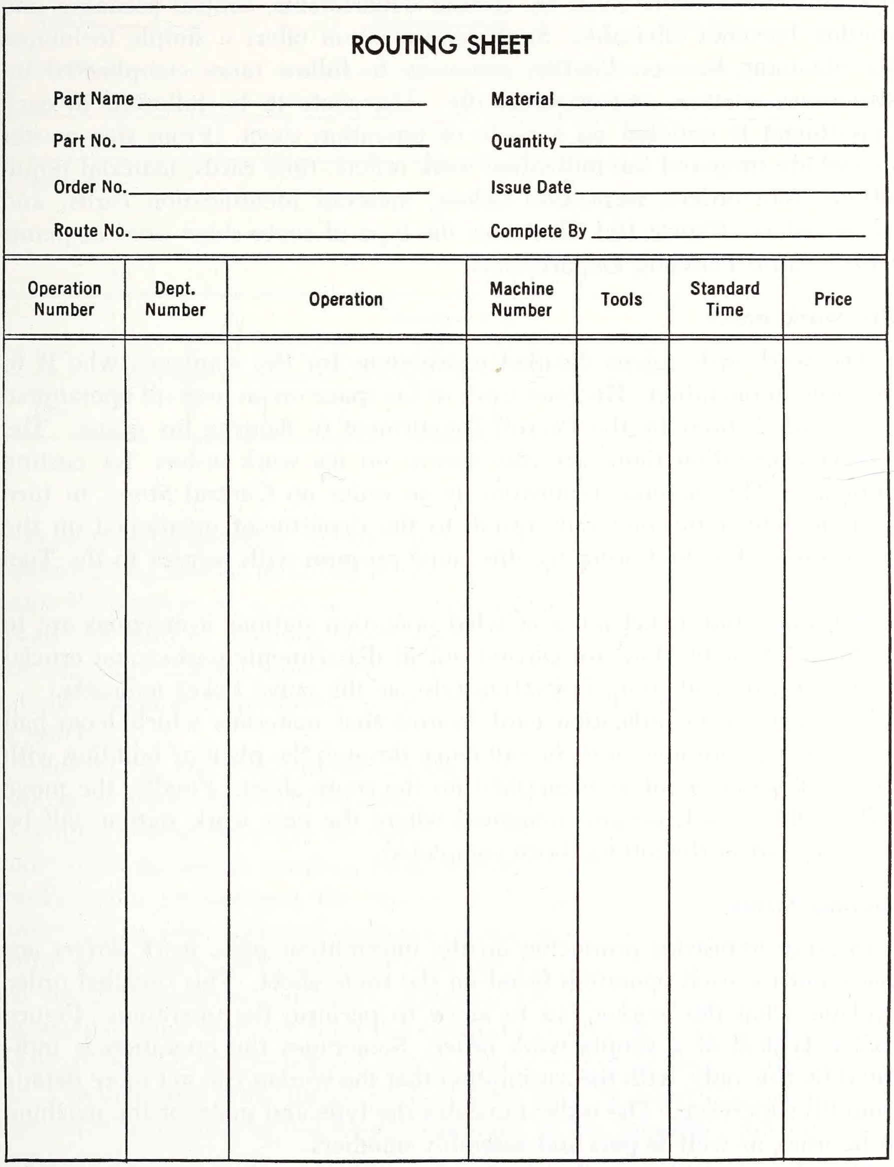
The one best way

The method of performing an operation in any business will determine its routing. But since there is usually more than one way of performing an operation, the person responsible for planning has to decide which is the best routing plan under the circumstances. Besides making a complete analysis of the operation to be accomplished, or product to be manufactured, he must know all the facts, including the completion date. The degree of accuracy called for in the specifications will help to decide the type of machine and degree of worker skill to be used. Availability of equipment for first choice and substitute uses must be figured and planned. The effect of using auxiliary equipment for quality work, or to increase productivity, must be considered. Whatever the type of business, there is always the question of availability of materials and equipment, as well as the justification of added expense for completion of the work. Finally, there is the important question of comparative costs under the various plans which are considered feasible.

Several choices of methods are frequently available for a single operation. For example, machine shops can take care of most turning operations on either a lathe or a boring mill. Planers, milling machines or shapers can be used to machine flat surfaces. Most lines of business have operational alternatives. Modern foundries are making the same type of mold by hand and by machine. Which plan to follow, assuming that machines are available, depends on the circumstances in individual cases.

FIGURE 16.1

Interdepartmental Route Sheet



ROUTING SHEET

Part Name ____________ Material ____________

Part No. ____________ Quantity ____________

Order No. ____________ Issue Date ____________

Route No. ____________ Complete By ____________

Operation Number	Dept. Number	Operation	Machine Number	Tools	Standard Time	Price

The route sheet

When an operation can be completed within a department, it is customary for the supervisor to plan and route the job. However, when an operation must be handled by several departments, central planning and routing becomes advisable. Such centralization offers a simple technique for obtaining the coordination necessary to follow more complicated instructions, on time and economically. The route to be followed in each department is outlined on a route or operation sheet. From this master record are prepared the individual work orders, time cards, material requisitions, tool orders, inspection tickets, material identification cards, and move orders. Figure 16.1 illustrates the type of route sheet used in plants with Central Planning Departments.

The work order

The work order gives detailed instructions for the employee who is to perform an operation. His time card, or his space on an over-all operational time card, is used by the Payroll Department in figuring his wages. The worker's operation times are also shown on his work orders, for costing purposes. The material requisition is an order on Central Stores to turn over or deliver the materials listed, to the department mentioned on the requisition. The tool order has the same purpose with respect to the Tool Crib.

The inspection ticket notes at what operation stations inspections are to be made. Usually they are carried out in departments performing crucial operations, or sent to an inspection crib, as the move ticket indicates.

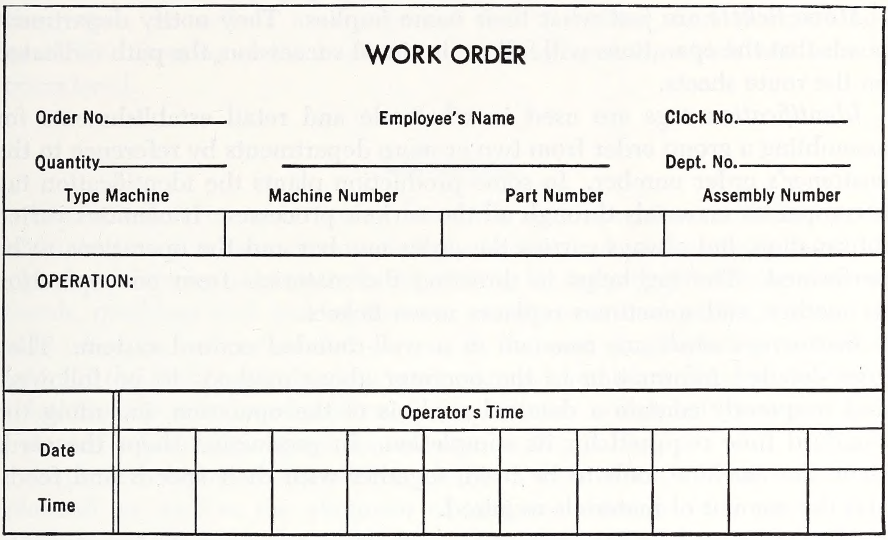
The material-identification card insures that materials which have had some work performed on them will move through the plant or building with the work order or lot as prescribed on the route sheet. Finally, the move order notifies each person concerned where the next work station will be after his part of the job has been completed.

Routing forms

In large industries producing on the intermittent plan, *work orders* are made out for each operation listed on the route sheet. This detailed order explains what the worker has to know to perform the operation. Figure 16.2 is typical of a simple work order. Sometimes the operation is indicated by title only, with the assumption that the worker can get more details from his supervisor. The order indicates the type and make of the machine to be used, as well as part and assembly numbers.

Material requisitions authorize Stores to issue specified materials for the work concerned. In a large operation, material requisitions must originate in the Central Planning Department. In connection with routing, requisitions are timed for delivery so that the materials will be where and when needed. Whether or not the exact quantity needed is requisitioned for

FIGURE 16.2



WORK ORDER

Order No.________ **Employee's Name** **Clock No.**________

Quantity________ ________________ **Dept. No.**________

Type Machine	Machine Number	Part Number	Assembly Number

OPERATION:

	Operator's Time									
Date										
Time										

production jobs depends on the nature of the work. For example, companies making special products to specifications often requisition extra raw materials because of a possible spoilage in processing. The relation between any kind of planning agency and Central Stores is also important. Not only does Central Stores get a list of needed materials well in advance, but the Planning Department must see that the materials are available or on order.

Tool orders are requisitions on the tool crib. Some concerns allow workers to draw and retain the tools required for their jobs as long as they are employed and have use for them. In large concerns, where an effort is made to get maximum use from tools, they are requisitioned by the Production-Planning Department for use on particular jobs and to designated workers. The plan followed depends on the size of the company and the nature of the tools. When special tools are expensive, their issue and control are correspondingly detailed. Before a job can be routed, the Control Department must find out from the Central Crib whether the desired tools are available. On large orders it may pay to have special tools made for the job. Planning may well discuss such matters with an experienced tool-crib man, especially since he has some knowledge of the possible future use for special tools.

Inspection orders ordinarily go to a centralized Inspection Department when the components of various products follow different routes through the concern. In some operations, inspection is a routine affair performed at fixed stations. However, where work orders are necessary, inspection may be anything but routine. In such cases, the Control Department must notify Inspection what, where, and when to inspect.

Move tickets are just what their name implies. They notify department heads that the operations will follow, in timed succession, the path indicated on the route sheets.

Identification tags are used in wholesale and retail establishments for assembling a group order from two or more departments by reference to the customer's order number. In some production plants the identification tag accompanies materials through all the various processes. It contains varied information, but always carries the order number and the operations to be performed. The tag helps in directing the materials from one operation to another, and sometimes replaces move tickets.

Instruction cards are common in a well-rounded control system. They give detailed information to the operator about methods to be followed, and frequently contain a detailed analysis of the operation, including the standard time required for its completion. In production shops the cards show the machine tools to be used, together with their speeds and feeds, and the amount of materials required.

Other routing criteria

There are many other tickets and orders used to control various kinds of operations. Their number depends on the amount of control desired. In some cases, the multiplicity of tickets seems to serve the whims of the person in charge of the system. Simplicity should be the keynote of control.

The capacity of different machines and individual operators also helps determine routing as well as scheduling. With these data and the others already mentioned, the routing chart is a graphic display of the steps through which the operation must pass. In a straight-line manufacturing setup, routing is comparatively simple after the production line is established. Many types of concerns are able to process some of their subassemblies on a straight-line basis, which is naturally the most expeditious plan. The limited capacity of some machines requires detailed consideration to accomplish planned operations and prevent bottlenecks. Conveyors are a prominent factor in line assembly work; intensive study is often required to find the special type most suitable to a given situation.

Many concerns engaging in repetitive operations maintain routing specialists who are continuously employed in refining the flow process for the purpose of increasing productivity. This job is concerned chiefly with work simplification or methods engineering. The use of flow charts in this connection was referred to in the preceding chapter. From the seemingly unnecessary number of technical terms used in this line of work, one might conclude that a deliberate conspiracy of confusion is afoot. But actually this specialized vocabulary gives a very accurate picture of the commonsense measures dictated by the nature of the planning process.

In conclusion, routing is a very important part of the general problem of control. Its planners require a thorough knowledge of the concern for which they work, as well as its equipment and operations, and the personnel available. Routing is the basis for scheduling control, which will now be considered.

Scheduling

The schedule controls timing from the first operation to delivery. Its ultimate aim is to minimize wasted equipment and worker times, and provide for deliveries as promised. Scheduling is charged with seeing that materials, machines and tool equipment, components and patterns are available when and where needed. It was in the area of scheduling that Gantt laid out the first charts showing work planned and work done in proximate relations. He introduced a form of visual control which led the way for the patented scheduling control boards now on the market.

Improved forms of scheduling charts compare work done with work planned, as well as the allotment of various materials with the amounts used during an hour or a work-day. The chief aids to scheduling are the work-load and the machine-load charts, which indicate the days and times that workers or machines are allotted for use. The blank spaces show personnel or machine availability. This simple system makes accurate scheduling possible and can lead to a full utilization of personnel and facilities if sufficient orders are available.

It must not be supposed that scheduling is as simple as the load charts indicate. In every concern of any size there are interruptions and delays due to facility breakdowns, absent personnel and other causes. Even scheduling of materials is not absolutely accurate because the supplier may be having similar machine and worker troubles, including strikes.

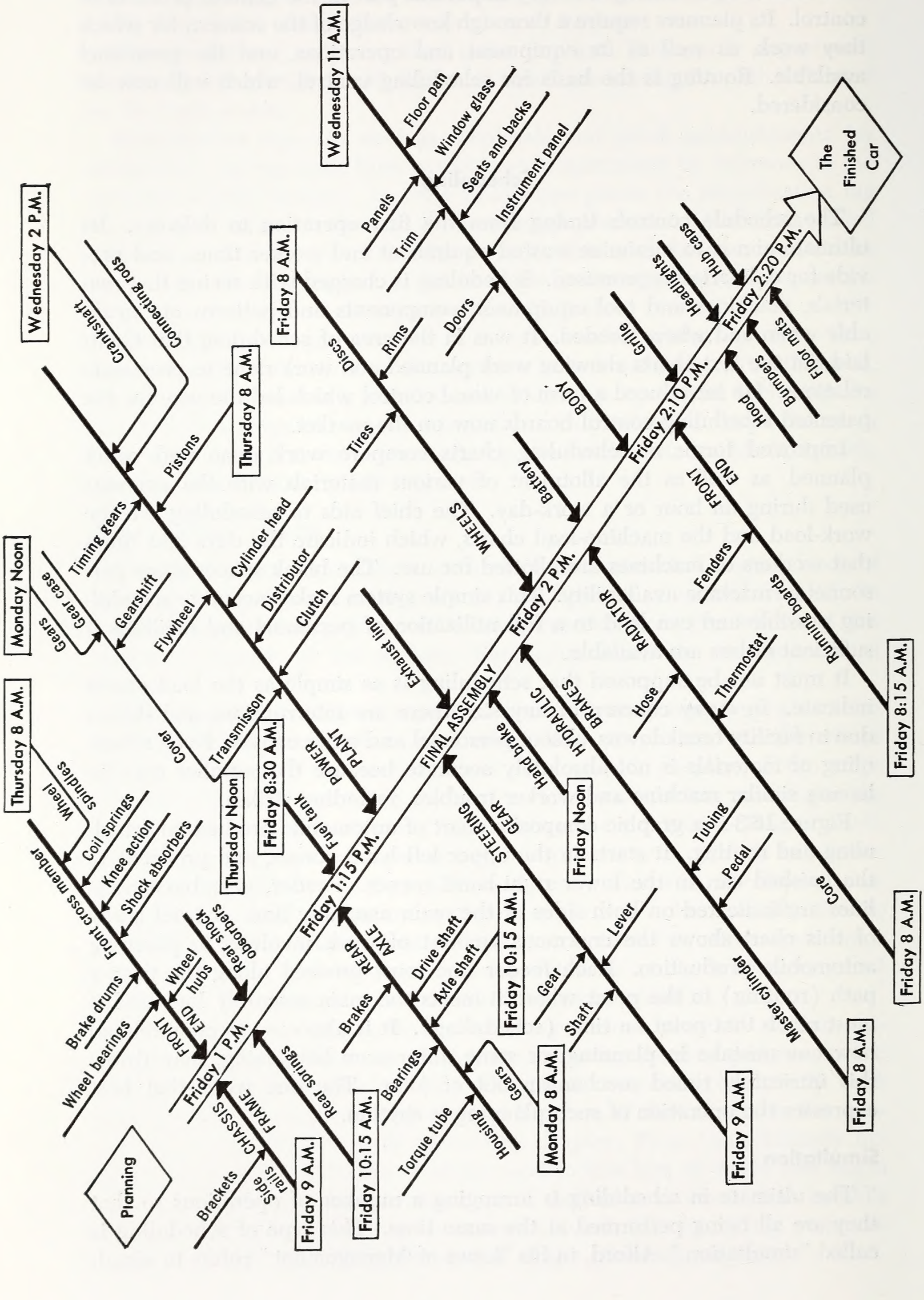
Figure 16.3 is a graphic composite chart of automobile production scheduling and routing. It starts in the upper left-hand corner, and proceeds to the finished car, in the lower right-hand corner. Feeder, or subassembly, lines are indicated on both sides of the main assembly line. A brief study of this chart shows the enormous amount of work involved in planning automobile production. Each feeder line must proceed along the proper path (routing) to the point where it meets the main assembly line, and it must reach that point on time (scheduling). It is also easy to comprehend how one mistake in planning, or some unforeseen happening, may throw this intricately timed mechanism out of joint. The one word that best expresses the operation of such planning is rhythm.

Simultation

The ultimate in scheduling is arranging a number of operations so that they are all being performed at the same time. This type of scheduling is called "simultation." Alford, in his "Laws of Management," refers to simul-

FIGURE 16.3

Composite Production Scheduling and Route Chart


Planning
Wednesday 11 A.M.
Floor pan
Window glass
Seats and backs
Instrument panel
Panels
Trim
The Finished Car
Wednesday 2 P.M.
Crankshaft
Connecting rods
Friday 8 A.M.
Discs
Rims
Doors
BODY
Grille
Headlights
Hub caps
Friday 2:20 P.M.
Floor mats
Bumpers
Hood
Friday 2:10 P.M.
FRONT END
Thursday 8 A.M.
Pistons
Tires
WHEELS
Battery
Timing gears
Cylinder head
Monday Noon
Gears
Gear case
Gearshift
Flywheel
Distributor
Clutch
Friday 2 P.M.
Fenders
RADIATOR
Running boards
Exhaust line
FINAL ASSEMBLY
Thermostat
Hose
Friday 8:15 A.M.
Thursday 8 A.M.
Wheel spindles
Cover
Transmisson
Friday 8:30 A.M.
POWER PLANT
HYDRAULIC BRAKES
Hand brake
Friday Noon
Thursday Noon
Coil springs
Knee action
Shock absorbers
Fuel tank
Friday 1:15 P.M.
STEERING GEAR
Tubing
Pedal
Core
Front cross member
Rear shock obsorbers
REAR AXLE
Drive shaft
Axle shaft
Friday 10:15 A.M.
Lever
Friday 8 A.M.
Wheel hubs
Brake drums
FRONT END
Brakes
Gear
Master cylinder
Wheel bearings
Friday 1 P.M.
Rear springs
Bearings
Gears
Shaft
Monday 8 A.M.
Friday 8 A.M.
CHASSIS FRAME
Side rails
Brackets
Friday 9 A.M.
Friday 10:15 A.M.
Torque tube
Housing
Friday 9 A.M.

tation as the third principle in production progress (division of labor and transfer of skills to the machine are the other two).[2]

Considerable use of simultation developed during World War II, especially in automatic machining operations, where bar stock on a rotating frame is fed simultaneously to each of the operating slots on the drum. If the operations were numbered one to seven, naturally there would not be a full simultaneous working of the seven operations until the rotating stock holder made a complete circuit of the operation heads. After the first complete circuit has been made, all operations are performed simultaneously with each station move of the rotating frame holding the raw material.

A simpler example is the bottle-filling operation, in which the older assembly plan of finishing one operation before the next was begun was heralded as a major triumph. Under the newer plan the first operator loads the bottles on the conveyor, the second fills them, the third labels them, the fourth seals them, and the fifth loads them into delivery crates. All operations are going on simultaneously, the pace being set by the speed of the conveyor.[3]

A significant feature of simultation is that the pace set is that of the average worker. Since the conveyor sets the pace, pay based on individual incentive is impossible. Under the conveyor-paced plan in effect in many automobile manufacturing concerns, individual wage incentives give way to increased group work. The psychological question arises of whether or not the simultation plan improves morale; the production economies it effects are unquestioned.

Scheduling periods

An inventory, sales or production schedule is a time budget. Recognizing the inevitable difficulties with men, materials and machines, scheduling is a scientific attempt to bring about an even and balanced flow of sales, personnel, materials and equipment, to minimize waste in idle time of equipment, working capital and man-hours and to meet customer deliveries. Top management is also interested in controlled scheduling as a means for bringing about an even flow of business on a long-term basis.

This aspect of scheduling leads to a consideration of control periods on a monthly or even longer basis. The schedule indicates whether pressure should be put on sales for more business, and for what types of products. On the other hand, if the schedule shows that the concern is sold ahead for a considerable period, delivery promises must be adjusted, and sales curtailed. In the merchandising business, the schedule-period type of control can be used to indicate future financing problems. If the term considered is long enough and the schedule shows a "sold-up" condition, it poses the question of a possible increase in inventory capacity, investment and personnel. These period schedules are best portrayed by graphic charts. They are more complicated in production, where they set forth the workload ahead in weeks or months for each machine, department and type of product.

---

[2] Simultation is the subject of Chapter 17 in John Younger and Joseph Geschelin, *Work Routing, Scheduling and Dispatching in Production* (3d ed.; New York: The Ronald Press Company, 1947). This reference is recommended to anyone desiring the operational details of simultation.

[3] *Ibid.*, pp. 117–118.

Scheduling charts are useful for similar control purposes in any line of business that wishes to plan ahead. In the mass-production industries, it is possible from records of past experience and from time study to estimate quite accurately the schedules for departments and products. To a less accurate degree, future schedule loads may also be set up for job shops.

In conclusion, scheduling, or timing of orders, is one of the important phases of planning. When effectively worked out, it smooths the flow and reduces costs. Improperly planned, it leads to delays, with consequent decline in productivity, general worker morale and customer satisfaction.

Dispatching

As has been mentioned, dispatching is the action phase of control. It gets into action as soon as authority is released to start the routing of an operation or order, whether the latter is for a customer or a production lot. Dispatch action follows the planned scheduling as far as possible, but it is the duty of dispatching to make adjustments that may be caused by manpower, material or machine irregularities.

Before a production order is actually started on its route by dispatching, the personnel, materials, tools, dies, jigs, fixtures, working drawings and detailed working instructions, including the various tickets showing methods and time standards for operations must all be ready. It is unreasonable to start operations if any one of these details is lacking.

Dispatching duties

The dispatcher's functions include the following:

1. Starting the job in accordance with the routing and scheduling plans which have been given him by the Planning Department.
2. Providing for the movement of materials to the various workplaces.
3. Providing for the movement of tools, dies, jigs and fixtures in accordance with their routing when production is involved.
4. Seeing that the work moves from one operating department to another according to the routing plan.
5. Moving items to inspection, as required.
6. Seeing that rejects are moved to the proper stations for attention.
7. Keeping a record of the starting and finishing times of all operations, for checking against the scheduled times and for job costing and payroll.
8. Reporting idle time of workers and machines, with reasons.

9. Recording all changes made in routing or other instructions, together with the reasons, for future guidance of the planning department.
10. Having finished products moved to shipping or storage.

Dispatching control

In keeping track of all its duties, dispatching can scarcely get along without some kind of planning board. Several types of patented boards are available for this purpose, but many companies make their own boards, feeling that they can better adjust them to the particular situation. In some cases, the dispatching technique can be very simple. The simplest, used in small concerns, especially where a given order can be completed within a single department, is a pair of small containers. One holds the unfilled orders and the other the completed orders, ready for invoicing. New orders are placed in the proper container by the main office. The person responsible for filling the orders picks out those which he considers proper for his immediate situation, and proceeds with their execution as the occasion permits. The plan works well when the department is not sharing jobs or operations with other departments. When departments are interdependent this plan will lose time and increase costs, besides creating confusion.

A more involved but still simple plan uses three rows of hooks or pockets for work orders or dispatching forms. Each set of three hooks represents an operation. The first hook holds work-in-process; the second has orders waiting for operation; and the last covers those which have not been officially released. By this system, both the dispatcher and the supervisor can closely estimate the relative amount of work-in-process, orders ready for attention and future orders.

If there are a number of operations, as is often the case in large concerns, sets of hooks may be fastened on a number of boards of uniform size, swinging on a pivot. Each board may be devoted to the various operations in a department, or in any other way best fitted to the circumstances. In a large concern, the dispatcher must have a master control board in his office. If it is not feasible to have supervisors come to the central control board to look over their work orders, duplicate boards suited to the different departments are installed and posted there. This plan provides for both centralized and decentralized control for dispatching.

Dispatching communications

Provision for execution of instructions on the move ticket is, of course, one of the important duties of dispatching. Moves are made in accordance with the schedules with which dispatching is supplied by the central office. Obviously, the transmission of information to the dispatcher's office and the multiplicity of orders flowing from his office to scattered operations and departments require a system of communication that will be both fast and sure.

The faster outgoing communication is effected, the better is the control from the dispatcher's office. Flowing toward his office, fast communication means more up-to-date control boards and reports on operator and operation times, to aid in necessary revisions of the schedules. Fast communication through the dispatcher's office also helps the Payroll and Costing Departments. Communications to and from the dispatcher's office are ordinarily taken care of by special messengers. Occasionally, where operations are spread out over large areas, or particularly fast service is necessary, some mechanical means is used, such as pneumatic tubes. Exceptional cases are found in the manufacturing and mail order companies with highly repetitive operations, where the dispatching function is of minor importance because routing and scheduling are usually taken care of by conveyors. With these continuous-process facilities dispatching becomes a matter of routine after an effective planning system has been installed.

Job-shop dispatching

Dispatching in a job shop presents the opposite extreme to that of continuous and repetitive production. When few customer orders offer any kind of operation or production duplication, dispatching sometimes becomes very difficult. The dispatching rules and procedures are the same but application of them to a mass of details offers many tribulations. The average large machine or tool shop is an example of difficult dispatching. Customer orders may require many machine operations. Furthermore, individual operations may be performed on any one of two or more different types of machines. In addition, tool-makers are not always amenable to central-office control. Since it is the tool-makers' custom to work on any machine in the shop, those with long experience often ignore instructions and find pleasure in proving, after operation times are recorded, that they know better ways for doing the work. This human factor makes a naturally trying job of control little less than exasperating for the dispatcher. So it is that job-shop concerns with elaborate dispatching systems, and not enough dispatch clerks to man the system, almost compel operators to follow their own wisdom or folly. In either case, dispatching is likely to become unsatisfactory.

Job-shop dispatching demands a much higher than average skill. Those working in the dispatcher's office must have a complete knowledge of shop and equipment conditions and all the methods which can be used for performing a given job. For a given volume of business, job-shop dispatching requires more and better clerks than for any other kind of dispatching.

Conclusions

The success of any task, in any line of business, is largely dependent on planning. In most cases, the degree of proper planning forecasts the probable degree of success. To the extent that this observation is true of the general planning function, it is also true of routing, scheduling and dispatching. In manufacturing, these three controls are vital to successful production. In completely continuous and repetitive industries, the conveyor does the routing and scheduling, as well as the pace-setting, but it must be realized that the closest kind of routing and scheduling was necessary to set up the conveyor-operated process in the first place. In fact, it was the routing and scheduling concepts that led to the conveyor method.

Planning in any business leads to smooth operations, with the maximum utilization of materials, men and machines, and therefore to minimum costs. The more complicated the business, the greater the need for planning, and hence the greater the value of proper planning. Increasing competition makes the planning factors here discussed so important that neglecting them will almost surely lead to failure. When the mechanical processes were simpler, and the chief trouble was trying to satisfy an increasing demand, rule-of-thumb operations often produced a satisfactory, or even a large profit. But these conditions do not exist in today's market place. Another consideration which has made detailed planning of importance is the government's multifarious regulations on the national, state and local levels.

These factors all add up to the necessity for a business enterprise to be ever on the watch for better ways of doing things and better ways of controlling the improved methods. At the same time there is an occasional tendency, especially with large-scale operations, to develop control systems to the point of diminishing returns. One definite measure by which to evaluate control systems is that they should not cost more to operate than they produce in savings. Indeed, any control system should show a wide margin of savings over costs. It should be realized that controls can effect more benefits than show up directly in dollar savings. Smooth operations are valuable from an over-all organizational standpoint. To the extent that they reduce managerial friction and operational confusion, they have large value, of which morale is not the least.

Planning of the controls discussed here involves both mental and mechanical or physical preparation. The mental preparation includes decisions about what, when, how, where and by whom. The mechanical preparations are the procuring of the equipment, materials and manpower needed for carrying out the plan. The two together bring quality performance on time at minimum costs.

QUESTIONS

1. What are the necessary auxiliary elements used with the major control processes of production?
2. How would you explain the statement that "Production Control bridges the gap between Sales and Manufacturing"?

3. In what way does the control activity lead to both vertical and horizonal problems in human relations?
4. To what extent should the production-control manager have authority over operations, and why?
5. What single word explains each of the three chief control techniques?
6. Discuss the contention that dispatching is merely a clerical job.
7. What are the principal elements included in routing?
8. What facts must be available to plan the "one best way" in laying out an operation?
9. Explain the necessity for the various data which appear on the route sheet.
10. What use is made of the various routing forms?
11. How would you use the machine-load chart in scheduling production operations?
12. How does lengthening of the time periods in controlled scheduling guide top management in regulating sales and the volume of production?
13. How does simultation reduce unit costs?
14. Why is scheduling called the action phase of control?
15. What are the dispatcher's chief duties, and why is a planning board essential for the adequate performance of most of them?
16. Explain the importance of speed in communications to and from the dispatcher's office.
17. Why is dispatching more complicated for a job shop than for either continuous or repetitive production?
18. What factors make planning so much more important in modern business than it was fifty years ago?
19. How would you explain the relation of planning to morale and costs?
20. If planning includes both mental and mechanical phases, how would you illustrate their contributions and their relation to each other?

CASE PROBLEM

TOWER MUTUAL LIFE

The Tower Mutual Life was organized as a stock company in 1880. Following the general trend in the insurance business, it was reorganized as a mutual company thirty years ago. Its management has been generally progressive, and its sales department particularly so. As a consequence of aggressive sales programs, careful premium rating for different risks, and fair dealing with its policy holders, it has become one of the largest concerns in its field.

Because of its large volume of business, Tower Mutual has had to deviate from the traditional life insurance organization. The pattern usually calls for six senior executives reporting to the president, who is responsible to the board of directors. Senior executives traditionally have charge of the following major functions: sales, agency management, investments, actuarial determinations, law, and the home-office operations. The prime considerations for life insurance success are sales, services and investments. These three basic activities require technical, actuarial, legal and medical advice.

A number of other specialists are needed to assist in the insurance program, including underwriters, claim approvers, accountants and statisticians.

Any company as large as Tower Mutual requires more organizational refinements than provided for in the typical pattern. Some of its problems demand the services of psychologists, dietitians and engineers. A complex business produces so many complex operational problems that it cannot function properly within a simple organizational structure.

The present setup of Tower Mutual consists of twelve vice-presidents in charge of important departments or activities. The business is operated through field offices directly responsible to the home office, and scattered throughout the forty-eight states. Most of the clerical work, and all top-executive activity, is centralized in Chicago. The company could scarcely function without its field offices, but even with their skilled and experienced personnel the service leaves much to be desired, partly because their limited authority does not match their responsibilities.

A general feeling is developing among the twelve senior executives that adequate managerial results are becoming very difficult to obtain, and will be almost impossible within the next few years. These vice-presidents not only determine top policies through their contacts with the directors, but they are also responsible for setting up procedures within their own departments. In addition, each one has general responsibility for a host of details affecting his activity. As might be expected, realistic control will become more difficult as expansion intensifies the demands for better coordination and more effective standards.

Among other things, the vertical lines of communication are becoming more confused and slower as the company grows. Horizontal communication is being affected even more seriously. Distances between field offices, which supervise the general agencies, and the home office also retard both communication and operations. Face-to-face communication has practically disappeared. Training programs are less effective than formerly, and there is no sure way to evaluate them, nor agree on reasonable uniformity in application. In particular, sales and home-office management are showing distinct signs of strain. Controls are becoming more and more difficult.

Urged on by the top-executive staff, the board of directors is considering decentralization of its operations on a regional basis, with control maintained through the establishment of more detailed policies. It has been suggested that regional decentralization into "little home offices" will permit better service to policy holders, and more initiative by the vice-presidents who would be reassigned on a regional basis. Each regional office would take care of all operations within its territory, under the proposed plan. Policies would be determined in the "big home office" which would also effect coordination through its advisory service to the regions. It is felt, too, that new ideas can be tried out in one of the regional offices before making any over-all changes. The plan also calls for periodic councils of the regional vice-presidents, with similar meetings for specific areas of operation.

PROBLEM. Draw an organization chart for the proposed plan of regional operations. Also discuss plans for assuring effective handling of the following problems, under the new idea, which are of some concern to the directors, who need all the advice they can get in advance for such a major change of organization and operation.

1. Policy-Making
2. Cost Control
3. Coordination of Regions
4. Qualified Manpower
5. Regional Initiative

CHAPTER 17

Methods and Time Study

Methods and time study are the foundation for effective business operations and industrial productivity, as well as the basis for sound wage policies. They can also be used to improve employee relations and cost controls. The study and improvement of methods as a background for making standard-time measurements involve an examination of the operator's motions, the condition and operation of his machine, the suitability of the materials being used, and the workplace. The workplace layout is particularly important for assembly operations. The general environmental situation must also be considered for establishing standard working conditions with respect to sanitation, lighting, ventilation, temperature and other conditions. Standard times are not possible with nonstandard methods and working conditions. Since standard times are the basis for scheduled production and most incentive plans, the conditions requisite for proper timing are essential.

After determining the best operator methods for accomplishing the work, as well as the proper quality of materials, the proper machine adjustment and the workplace layout most helpful to the worker, the improved situation should be standardized under those conditions. Only after the worker has been instructed and is reasonably experienced under the improved conditions should the timing of actual operations start.

Advantages of methods and time study

Methods and time study are the fundamental tools of management for the following purposes:

1. Analyzing manual motions and machine operations for the purpose of increasing productivity and decreasing costs
2. Fixing standard operation times for incentive wages
3. Establishing production quotas for hourly rated employees

4. Balancing the work force with the volume of work
5. Determining plant and machine capacities
6. Aiding in the purchase of new equipment
7. Improving tools, dies, jigs, fixtures and equipment
8. Improving the quality of the work
9. Reducing worker fatigue

Improving Operations. Operations can be improved by analysis and study of the motions of the machine operator or assembly worker, for the purpose of eliminating false or fatiguing motions by balancing and rearranging the sequence of his movements so that he accomplishes better work in faster time and with less fatigue. The improvement of the machine's operation is often accomplished by changing its speed and improving its cutting or other equipment. Any improvement in method reduces operation and production costs.

Standard Times. Standard times are necessary for setting piece rates or any type of incentive wage. They may be determined purely on the basis of past experience, but that method is in no sense scientific since it may be based on erroneous data. Standard times are also used to determine production quotas for hourly rated employees. For this use they are frequently slowed somewhat to insure the quality production which hourly rates emphasize.

Balanced Work Force. It is only through the establishment of standard operating times that management can determine the number of workers necessary to accomplish a given workload. The number of workers sets the standard for the number of machines and equipment required, as well as the quantity of materials and supplies. Balance in operators and equipment is essential for planning a balanced operation or production program. Finally, plant capacity as determined through the use of standard operating times is essential in fixing sales quotas for which delivery promises can be maintained.

Buying New Equipment. Skilled method and time-study engineers, by cooperating with the maintenance department, are in a position to offer valuable suggestions for the purchase of new machines and equipment. In their study of present machines, they obtain ideas about what changes will increase productivity and reduce unit costs.

Quality Production. Methods engineers also appreciate the relation between proper materials and the production of quality work, which is an important form of insurance against the inroads of competition. Quality results from proper materials, adequate machines and skilled workers. The methods engineer is conversant with all three of these essentials, and is in position to pass on his findings to top management and the production department, for the insurance of quality merchandise.

Worker Fatigue. There are two kinds of fatigue. One is the healthy variety which results from pleasant and effective work. It is recouped through rest and sleep. The other kind comes from lack of harmony in body and mind at the workplace. It is not entirely recouped by rest, but can accumulate to the detriment of both the worker and his production. Proper body motions on the job aid the worker in changing from the unhealthy to the healthy fatigue. Standard times and well-distributed workloads, together with proper environmental conditions, improve the worker's mental reactions on the job and stimulate healthy fatigue.

Development of methods and time study

The first book on time study in the United States was written in 1920 by Dwight V. Merrick, a time-study man who worked with F. W. Taylor. The techniques for determining standard operating times have made substantial progress during the past thirty years. First known simply as "time study," the plan later added "motion study." The title then became "time and motion study," showing the historical development of the subject, but probably used in this sequence for euphony.

Later, because motion study preceded the taking of times, the title was changed to "motion and time study." And finally, as the study of operator motions was expanded to include the machine, materials, workplace, and the general working environment, the subject came to be known as "methods and time study." These changes over a period of little more than thirty years indicate how rapidly the field has developed.

Although time studies were made in England and France prior to 1920, Taylor's work in this field, starting at the Midvale Steel Company in 1881, developed more detail by breaking down operations into motions and elements. An *element* is the smallest number of motions that can be practically isolated, and for which dependable elapsed times can be recorded.

Frank B. Gilbreth and his wife subsequently developed many of the improved techniques now in general use in the study of machine- and assembly-operator motions. They classified hand motions under seventeen fundamental types, now known as "therbligs," coined from spelling Gilbreth backwards. Figure 17.1 shows the hand motion symbols which were developed by the Gilbreths.

Many changes and improvements in methods and time study have developed from discussions and papers read before the Society for the Advancement of Management (successor to the Taylor Society), the American Management Association and others.

Methods analysis

The time-study engineer does not make his analysis of methods and motions haphazardly. He is concerned with the performance of the human body, arrangements and conditions of the workplace, design of tools and equipment, and correct procedures for analysis. Many principles and cor-

FIGURE 17.1

Standard Symbols and Colors for Fundamental Hand Motions

Name of Symbol	Therblig Symbol		Explanation-suggested by	Color	Color Symbol	Dixon Pencil Number	Eagle Pencil Number
Search	Sh	👁	Eye turned as if searching	Black	≋	331	747
Select	St	→	Reaching for object	Gray, light	░	399	734½
Grasp	G	∩	Hand open for grasping object	Lake red		369	744
Transport empty	TE	◡	Empty hand	Olive green	▧	391	739½
Transport loaded	TL	⌣	A hand with something in it	Green	▨	375	738
Hold	H	⊓	Magnet holding iron bar	Gold ochre	▨	388	736½
Release load	RL	⌒	Dropping content out of hand	Carmine red	■	370	745
Position	P	9	Object being placed by hand	Blue	▤	376	741
Pre-position	PP	8	A nine-pin which is set up in a bowling alley	Sky-blue	▤	394	740½
Inspect	I	0	Magnifying lens	Burnt ochre	xxx	398	745½
Assemble	A	#	Several things put together	Violet, heavy	▦	377	742
Disassemble	DA	ǂ	One part of an assembly removed	Violet, light	▩	377	742
Use	U	U	Word "Use"	Purple	▥	396	742½
Unavoidable delay	UD	⌒o	Man bumping his nose, unintentionally	Yellow ochre	△△	373	736
Avoidable delay	AD	∟o	Man lying down on job voluntarily	Lemon yellow	⁘	374	735
Plan	Pn	P	Man with his fingers at his brow thinking	Brown	□□□	378	746
Rest for over-coming fatigue	R	ℓ	Man seated as if resting	Orange	○○○	372	737

Reprinted from Ralph M. Barnes, *Motion and Time Study* (New York: John Wiley & Sons, Inc., 1953) with permission of author and publisher

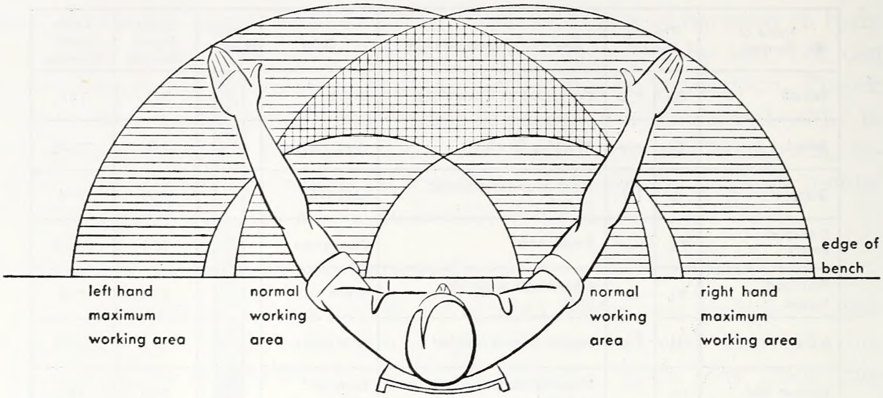
ollaries of motion economy have evolved for finding the best methods of gaining rhythm, maximum performance, automaticity, minimum fatigue and proper motion sequence. The location of tools and materials is important for promoting proper sequence of worker motions. A semicircular work bench is usually provided for assembly operations, where the prepositioned tools and materials are arranged in an arc within the normal reach of both hands. Figure 17.2 shows the normal and maximum working areas for the hands.

Charting the study

Since it is important to study the operation from an over-all point of view,

FIGURE 17.2

Normal and Maximum Working Areas for the Two Hands



a process chart is used to plot or picture the progress of the worker, the materials and the paper forms through the office or plant. The purpose of analyzing the chart is to reduce the distance and travel time of the worker and materials by establishing improved and systematic procedures through study of existing methods. (See Figures 32.1 and 32.2 in Chapter 32.)

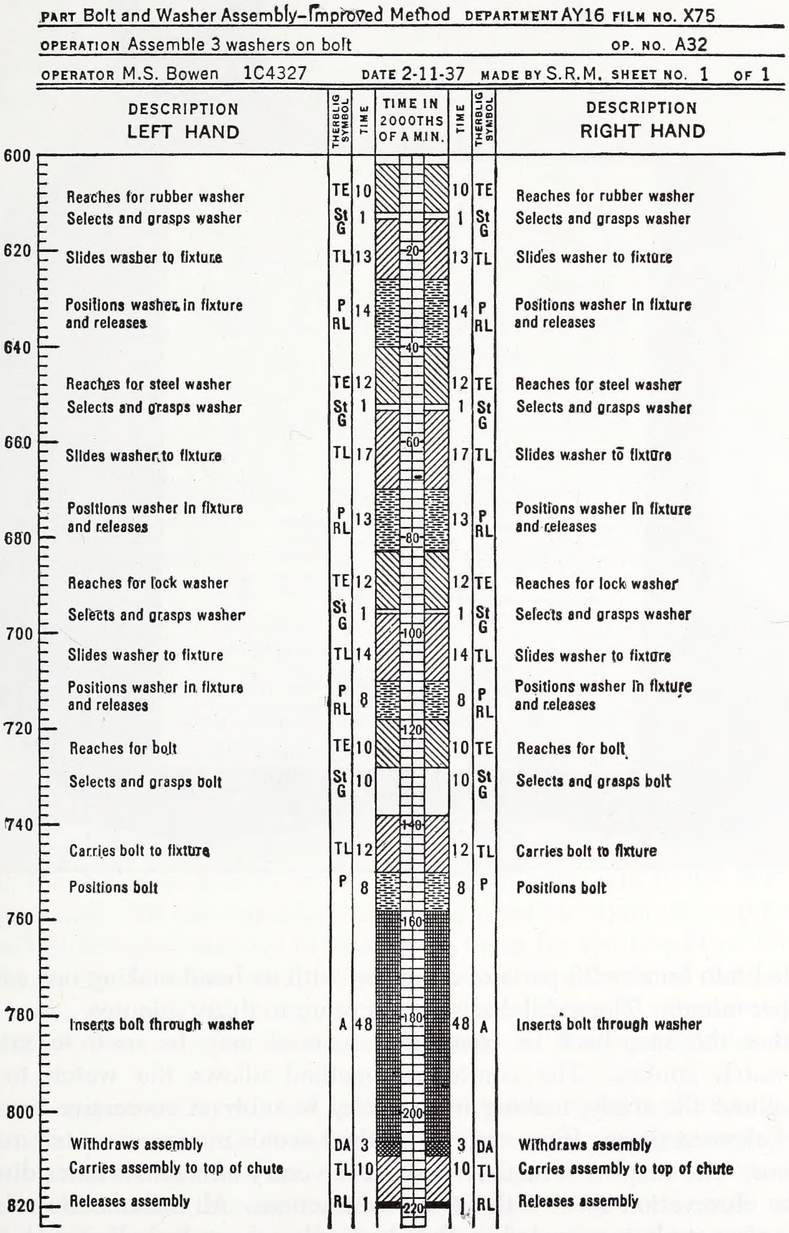
A further analysis of operations can be obtained by an operation chart, also known as the "right-and-left-hand" or "simo" chart. The simo chart registers simultaneously the detailed motions of both hands at all stages of an operation, together with the times required. The chart may show that one hand is working while the other is idle, or that for certain periods during the operation both hands are idle. Obviously, maximum productivity results when both hands are employed constantly. It can be demonstrated, also, that worker fatigue is minimized when this condition has been satisfied. When both hands are not working all the time, or most of it, then the principles of motion economy, including such alterations as combining, eliminating or changing the sequence of motions must be considered for making the necessary changes and corrections. Figure 17.3 shows a simo chart with recorded operations for a bolt and washer assembly after the improvements have been made.

Time study equipment

The essential tools for time-study work include a stop watch, time-study observations sheets, and a clip board to hold the watch and sheets. Holding the board on his left arm, with left hand at the watch control, the time-study man has his right hand free for recording the observations. Most time studies are made with the decimal minute watch, on which the large dial is

FIGURE 17.3

Simo Chart for Bolt and Washer Assembly
After Improvements Have Been Made



MICROMOTION STUDY

SIMO CHART

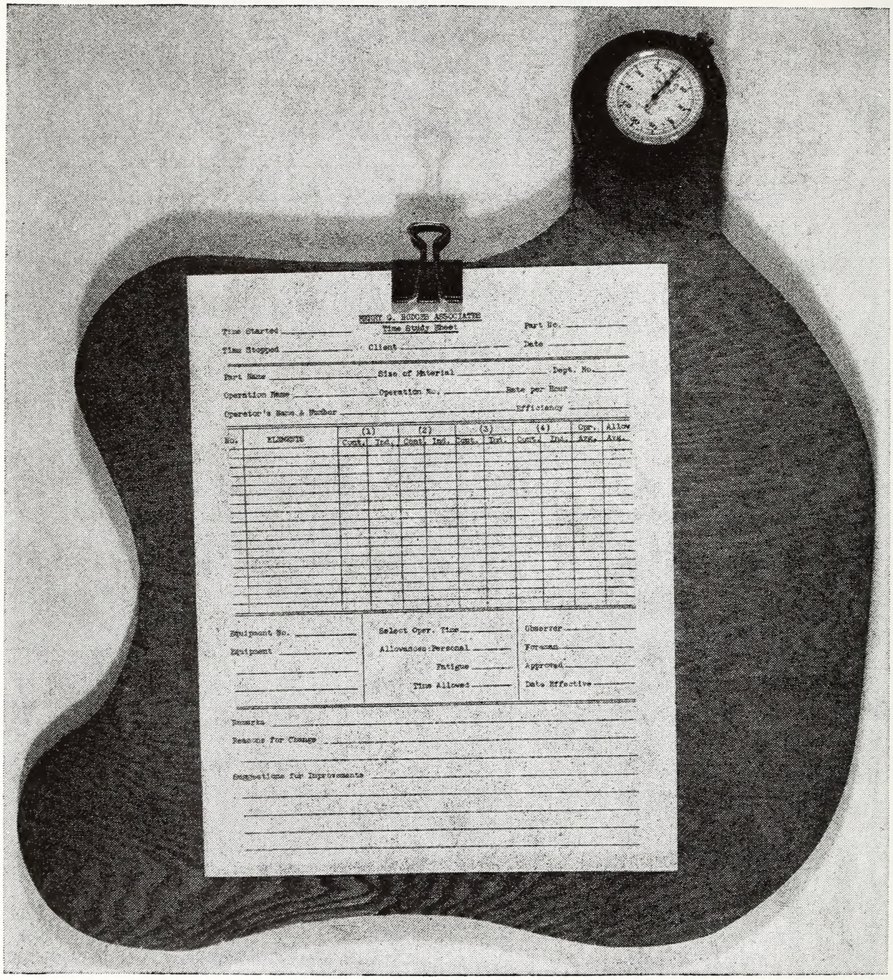
PART Bolt and Washer Assembly–Improved Method DEPARTMENT AY16 FILM NO. X75
OPERATION Assemble 3 washers on bolt OP. NO. A32
OPERATOR M.S. Bowen 1C4327 DATE 2-11-37 MADE BY S.R.M. SHEET NO. 1 OF 1

DESCRIPTION LEFT HAND	THERBLIG SYMBOL	TIME	TIME IN 2000THS OF A MIN.	TIME	THERBLIG SYMBOL	DESCRIPTION RIGHT HAND
Reaches for rubber washer	TE	10		10	TE	Reaches for rubber washer
Selects and grasps washer	St G	1		1	St G	Selects and grasps washer
Slides washer to fixture	TL	13		13	TL	Slides washer to fixture
Positions washer in fixture and releases	P RL	14		14	P RL	Positions washer in fixture and releases
Reaches for steel washer	TE	12		12	TE	Reaches for steel washer
Selects and grasps washer	St G	1		1	St G	Selects and grasps washer
Slides washer to fixture	TL	17		17	TL	Slides washer to fixture
Positions washer in fixture and releases	P RL	13		13	P RL	Positions washer in fixture and releases
Reaches for lock washer	TE	12		12	TE	Reaches for lock washer
Selects and grasps washer	St G	1		1	St G	Selects and grasps washer
Slides washer to fixture	TL	14		14	TL	Slides washer to fixture
Positions washer in fixture and releases	P RL	8		8	P RL	Positions washer in fixture and releases
Reaches for bolt	TE	10		10	TE	Reaches for bolt
Selects and grasps bolt	St G	10		10	St G	Selects and grasps bolt
Carries bolt to fixture	TL	12		12	TL	Carries bolt to fixture
Positions bolt	P	8		8	P	Positions bolt
Inserts bolt through washer	A	48		48	A	Inserts bolt through washer
Withdraws assembly	DA	3		3	DA	Withdraws assembly
Carries assembly to top of chute	TL	10		10	TL	Carries assembly to top of chute
Releases assembly	RL	1		1	RL	Releases assembly

Reprinted from Ralph M. Barnes, *Motion and Time Study* (New York: John Wiley & Sons, Inc., 1953) with permission of author and publisher.

FIGURE 17.4

Timing Board with Stop Watch and Time-Study Sheet Attached



HENRY G. HODGES ASSOCIATES
Time Study Sheet

Time Started ________ Part No. ________
Time Stopped ________ Client ________ Date ________

Part Name ________ Size of Material ________ Dept. No. ________
Operation Name ________ Operation No. ________ Rate per Hour ________
Operator's Name & Number ________ Efficiency ________

No.	ELEMENTS	(1)		(2)		(3)		(4)		Opr.	Allow
		Cont.	Ind.	Cont.	Ind.	Cont.	Ind.	Cont.	Ind.	Avg.	Avg.

Equipment No. ________
Equipment ________

Select Oper. Time ________
Allowances: Personal ________
Fatigue ________
Time Allowed ________

Observer ________
Foreman ________
Approved ________
Date Effective ________

Remarks ________
Reasons for Change ________
Suggestions for Improvements ________

divided into hundredth parts of a minute, with its hand making one revolution per minute. The small dial shows runs up to thirty minutes.

Either the snap-back or continuous method may be used in making stop-watch studies. The continuous method allows the watch to run throughout the study, making it necessary to subtract successive readings to get element times. However, this method avoids numerous watch manipulations. The snap-back method permits the entry of element times directly on the observation sheet without the subtractions. All information relating to the time study is recorded on the observation sheet, including such items as the date, department, operator, timer, the element being timed, and remarks by the timer. Observation-sheet information is not only vital to the answer sought for the element involved, but it can be very important at a later time in defending that answer with union representatives. Figure 17.4 shows the timing board with stop watch and typical time-study sheet attached.

When it is necessary to time elements of short duration, the stop watch may not be so reliable as some other timing device. If the element runs for .01 of a minute or less, it can be timed accurately by the Marsto-Chron machine. Another device, the wink counter, makes accurate reading to .005 of a minute.

Steps in time study

Methods or time study should not be undertaken except with the complete understanding and cooperation of top management. As a technical device it should be accepted throughout the organization, including foremen, union leaders and workers, before operations are begun. Good judgment suggests that the subjective element be conceded in discussing standard times with both management and workers. Standard times are not always accurate, otherwise time study engineers could not come up with different answers to the same problem. But it should be emphasized that the timers have professional reputations at stake and are honestly interested in being as objective as possible. It can also be stated that when standard times are determined by modern technical methods, they are far superior to the estimating methods which preceded them.

The initial study in a plant or office should be made where there has been trouble about the pay or amount of work expected. Under such conditions, both sides are receptive for an outsider's opinion. When the operation has been selected, the work should not start until the foreman and the worker to be studied are both cooperative, and if possible also interested. They should have a full and frank explanation of what is to be done and how, and questions should be invited.

At the start of the timing, an effort should be made to put the operator at ease. He should be told to work at his normal pace, and forget that he is being timed. An uncooperative operator, possibly trying to support his union's philosophy, may try to make slow times for the benefit of his slow brothers. On the other hand, another operator may try to see how fast he can work. It is possible to correct both of these abnormal times, but better results are obtained from the worker who can and does maintain his normal pace.

Since operators vary in skill, effort, consistency, speed and other factors, the one to be used for the study should be chosen from a group having more than one worker on the same operation. Management may want one of the best workers timed, hoping thereby to influence other workers to use his methods. Labor may object, feeling that all workers will be expected to maintain the pace of the "fireball." Many engineers favor timing the above-average worker because his speed is usually more consistent, and his motions better coordinated. This type of worker may also use methods which will be found advantageous in training others. The person most often selected for the study approximates a normally skilled operator, working at a normal pace under improved and standardized working conditions.

In going over the operating details with the foreman, it may be discovered that the usual machine for doing work under study has been shifted to another department, that the tools need sharpening, or that the jigs and fixtures can be improved. Unless these factors are corrected, the time set for doing the job will be out of line. The time-study man must determine when the operation is ready for study.

The human factor in the study is equally important. After the foreman has selected the employee whom he considers a normal worker, the question of his willingness to cooperate must be considered. If the first few minutes of operation show that he is consciously slowing down, it is customary for the time-study man to suggest that he is "probably not up to snuff today" and excuse him until "some other day," which may never come.

All necessary information such as the names of the operator, the operation, department, machine, materials, parts, fixtures and other items, is recorded on the observation sheet. Occasionally, a drawing of some piece of equipment and of the work performed on it is included. It is also well to sketch the workplace, with important dimensions indicated.

Each operation is divided into elements. The finer the breakdown, within reason, the more accurate the results, and the more useful the element times for subsequent operation study. It must be understood that it is humanly impossible to observe and record accurate watch readings for successive infinitesimal elements. A description of the start and finish of each element will be helpful in analyzing these basic divisions of accomplishment. The element terminals serve as a tool for over-all motion study since each element is a series of motions which are definitely recognizable.

It would be unfair not to measure each element a sufficient number of times to make sure that the sample is representative. If only one or two values were obtained for each element, there would always be a chance that they were abnormally high or low, and therefore not typical of what should be expected on the job. It must not be thought, however, that all abnormal readings should be eliminated because the very nature of the work may be responsible for occasional longer times. The drilling time on an occasional hard casting is an example of a retained abnormal time, while a high or low time value due to an error in reading the stop watch, or a piece sticking in a die, would be thrown out.

Computing the time

After sufficient time observations of an element have been recorded, there are several satisfactory methods for determining the representative value of the element. The *simple average time* for the element is computed as follows:

1. All exceptional readings are eliminated.
2. The remaining items are added, and then divided by the number of items.
3. The answer is known as the arithmetic mean, simple average, or mean, all of which are synonomous.

Let us take a hypothetical "Element X," which has ten observations recorded for the same operator as follows: .14, .10, .09, .12, .14, .15, .12, .11, .12 and .12 of a minute respectively. Now, since the arithmetic mean is based on all the times (ten in this example), its value can be substantially influenced by extremes. Extremely high values will tend to make the time slow, while very low readings will make the time fast. If the nontypical readings are eliminated before the mean is computed, the result will have representative significance. Examination of the ten values for Element X does not show any readings to be extremely high or low, therefore all of them should be used in computing the mean. If one of the values were .25, and the time-study man felt that this was not typical of what was expected, this reading would be eliminated, and the result would be based on the other nine readings. Since there are no exceptional readings in the present example, the arithmetic mean for Element X is computed as follows:

$$\frac{\text{Sum of the 10 observations}}{\text{Total number of observations}} = \frac{1.21}{10} = .121$$

The influence of extreme values is automatically eliminated when the *median* is the computed average. Since the median by definition is the middlemost value, it is a positional measure on which the small and large readings have no effect. It is computed as follows:

1. All exceptional (nonrepresentative) readings are eliminated.
2. The remaining items are arrayed by listing the readings from the highest to the lowest, or vice versa.
3. The middlemost value of the array is that which divides it into two equal parts, so that half the readings are above it in value, and half below.

Table 17.1 shows the array of readings for Element X. The middlemost value is found between readings 5 and 6. Since both 5 and 6 have a value of .12, the reading 5.5 will also have a value of .12.

The median value of .12 is not influenced by the smallest value in the array (.09), nor by the largest value (.15). This is important in cases where the time-study engineer is in doubt whether such items belong in the study.

The *modal value* (mode), or the most frequent reading, can also be determined for the Element X from the array. Since .12 appears four times, and no other reading appears more than twice, it is by definition the mode.[1] High and low values influence the mode only when the addition or deletion of such a value causes a change in the most frequently recorded time. In the example used, an additional reading of .15 would not influence the

---

[1] The values of the arithmetic mean, median and mode will often be different, but it is possible for any two, or all three, to be the same.

TABLE 17.1

Computation of the Median for Element X

Readings		Values
1		.09
2		.10
3		.11
4		.12
5	MEDIAN	.12
6		.12
7		.12
8		.14
9		.14
10		.15

modal value, but the addition of four such values would change the modal value to .15.

Whether the selected time values are based on the arithmetic mean, median or mode, or some other method, is determined by the nature of the data, the judgment of the observer, and the ease of calculation. In any case, it is paramount that the selected time be representative and mathematically correct.

Human variability

There is considerable variation among workers. Some are more skilled than others, and some put forth more effort. The speed of the operator is a prime factor in timing the operation, so the time-study engineer must judge how the observed performance compares with that of a normal operator. If the operator displays the skill and effort of an average experienced employee who is physically and mentally qualified for the work, who has been properly trained, and who is concentrating on the task, it is unnecessary to apply any *rating* or *leveling factor* for the purpose of adjusting the time of the fast or slow worker to the average.

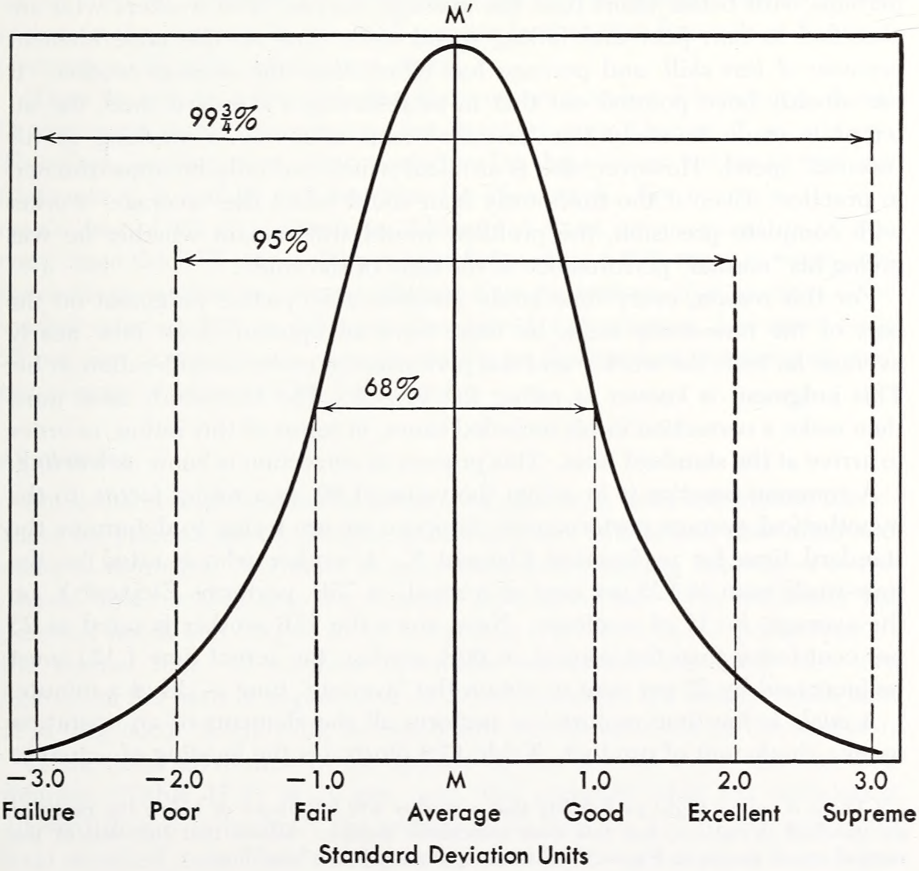
It can be seen from the normal or bell-shaped curve of worker variability in Figure 17.5 that the spread is in terms of standard deviations around the arithmetic mean "M." Since standard operation times are used in setting up incentive wage plans, a knowledge of the distribution of worker productivity is useful in adjusting such wage plans to management wage policies. In adjusting the technical standard to management policy, it may be decided that a "tight" (fast time) standard, with a high premium for attainment, will urge the workers with mediocre ability to meet the standard.

The opposite view holds that unless the technical time standard is adjusted upward (slow time), with relatively low premium pay, so that more than the majority of workers can meet it, discouragement will soon prevent their trying. These two time plans, faster and slower than the technical standard, usually result in similar unit labor costs. The difference is mostly one of psychology in deciding which plan will result in greater effort on the part of the largest number of workers. The answer may well differ under various sets of circumstances.

Although the highest point (M) on the normal curve fixes average worker performance, around which the greatest number of workers will be found, it is important to note that worker performance will vary within the approximate range of six standard deviations, three above and three below the average M, or when looking at the normal curve figure, three to the right of M and three to the left of it. The standard deviation is the statistician's method of showing the spread of the number of items (in this case, workers) above or below the arithmetic mean, which refers to those between selected points on the horizontal axis. For example, if productivity is plotted on the horizontal axis, and the number of workers on the vertical axis, the study of

FIGURE 17.5

Worker Variability



a large number of workers performing a given operation would probably show that half of them were above average in performance and the other half below average.

Most of the workers would be close to the average, with slightly more than two-thirds found within one standard deviation above or below M. The area between the arrowheads in the figure is approximately two-thirds of the total area under the curve, and hence represents two-thirds of the workers. This group will vary from "fair" through "average" to "good," while those workers who fall between one and two standard deviations from the mean will be classified as either "poor" or "excellent." This entire group, from "poor" through "excellent," will include 95 per cent of the workers, under normal conditions. The area from three standard deviations below the mean to three above will include practically all the workers from "failure" to "supreme" classifications.[2]

Method for rating and leveling

Workers classified as good, excellent and supreme take less time to perform a given element since they work with greater skill and speed, and perhaps with better effort than the average worker. The workers who are classified as fair, poor and failing spend more time on the same element because of less skill, and perhaps less effort, than the average worker. It has already been pointed out that in establishing a standard time, the attempt is made to study the "average" man while he is working at his "normal" speed. However, this is an ideal which can only be approximated in practice. Even if the time-study man could select the "average" worker with complete precision, the problem would still remain whether he was giving his "normal" performance at the time of the study.

For this reason, every time study involves a subjective judgment on the part of the time-study man: he must form an opinion about how nearly average he feels the worker and the performance under consideration to be. This judgment is known as *rating* the worker. The time-study man must then make a correction in his recorded times, in terms of this rating, in order to arrive at the standard time. This process of correction is know as *leveling.*

A common practice is to assign the value of 60, as a *rating factor,* to the hypothetical average performance. Suppose we are trying to determine the standard time for performing Element Y. A worker who is rated by the time-study man at 125 per cent of normal, or 75R, performs Element Y, on the average, in .12 of a minute. Now, since the 75R worker is rated as 25 per cent faster than the normal, or 60R, worker, the actual time (.12) must be increased by 25 per cent to obtain the "average" time — .15 of a minute.

A *cycle* is the time required to perform all the elements of an operation upon a single unit of product. Table 17.2 illustrates the leveling of actual to

[2] There is only a slight probability that a worker will fall above or below the range of six standard deviations, but this does sometimes happen. Notice that the tails of the normal curve shown in Figure 17.5 never quite touch the base line.

TABLE 17.2

Leveling for a Cycle of Four Elements

Element	Watch Reading (Minutes)	Rating of Time-Study Man	Rating: Per Cent of Normal	Allowed Normal Time (60R) *
A	.98	90R	150	1.47
B	.32	75R	125	.40
C	1.88	45R	75	1.41
D	1.02	80R	133	1.36
			CYCLE TIME	60R . . . 4.64

* The time that an average operator would require to do the job if he worked at normal speed.

standard times in a cycle of four elements. For the sake of simplicity, let us assume that each watch reading shown in the table is obtained from averaging twenty observations of a single worker. (In practice, additional workers would probably be timed and the cycle times of all the workers observed would then be averaged.) To illustrate the use of several different rating factors in the same cycle, we shall assume further that for each of the four elements a different worker was timed.

It can be seen from the table that the workers timed on Elements A, B and D were rated faster than average, but the worker on Element C was slower. Therefore, leveling must allow more time for the average worker to perform Elements A, B and D, and less time for Element C. For example, the 90R man's time of .98 of a minute on Element A must be increased by 50 per cent, since the 90R man is 50 per cent faster than a 60R man, in order that the average worker will have sufficient time to perform that element. The worker rated at 45R on Element C required 1.88 minutes, but since he is 25 per cent slower than an average worker on this element, the time allowed the average worker will be 1.41 minutes.

Allowances

Since the normal time for an element or operation does not contain allowances for personal needs, fatigue, and delays due to machine downtime and material shortages, they must be accounted for by adding allowances to the normal time for obtaining the standard operation time. It is customary for personal needs and fatigue to be lumped as a predetermined percentage of the normal time. If machine downtime allowances are used, they are figured on the basis of experience. Material shortages are usually taken care of as they occur by allowing an hourly rate for the time lost by the operator.

If the total allowance to be applied to the normal cycle time of 4.64 minutes (Table 17.2) is 10 per cent, the accepted plan for calculating allowed time is to multiply the normal cycle time by 1.11 to determine the total standard time. This 1.11 figure is based on the assumption that 10 per cent for allowances leaves 90 per cent of the time for production, so the total time, or 100 per cent, is divided by the production time, or 90 per cent, which equals 1.11. Multiplying the production-cycle time of 4.64 minutes by 1.11 gives the standard time in this case as 5.15 minutes.

Before the time-study man leaves his job he should go over his work with the foreman to make certain that they are in agreement, and the foreman should be given a copy of the observation sheet. It is not satisfactory to make a time study one day and leave it the next. The study should follow through, possibly for several weeks, to make sure that the work has been done adequately.

Standard data

If all the different elements that have occurred in all the time studies made on a given class of work were recorded, standard time data could be developed for use on the same elements appearing in subsequent operations. Such standard elements are referred to as *synthetic times* when used in an operation different from the one for which they were originally timed. In using synthetic times, it is necessary to analyze the motions involved in the new operation to determine its elements. If some additional motion appears in the element contemplated for use as a synthetic time, it is really a different element, and the added motion must be timed to prevent the use of an elemental time that is too tight.

Since standard data are derived from numerous observations and adjustments to normal times, their cost is considerable. However, the fact that these standard element times can be used over and over again in many different operations makes the initial high cost well worth while in the long run. Some management consulting firms "sell" standard time data. They provide standard-time tables for carefully defined hand and body motions, and combinations of motions. The procedure for establishing standard time data is called "Methods-Time-Measurement," and referred to as MTM. Its use has both vigorous proponents and opponents, but it seems reasonable to predict that the idea will have more acceptance and greater value as its techniques are refined. It is already accepted in highly repetitive assembly or manually controlled operations, but is not preferred as a tool for setting standards on operations controlled by the process method.

Labor–management reaction to time study

The early history of methods and time study shows opposition from both labor and management. Much of the opposition can be traced to the manner in which the studies were formerly conducted. It was not only a question of what was done, but also how it was done. Stories of a man of mystery suddenly appearing in the plant without explanations to the workers are all too true. Management wondered how an outsider could improve production times and methods when the foremen with years of experience had not been able to do so. Labor was justifiably suspicious of a technical device which it did not understand. In addition, management occasionally tightened times which had been technically determined, in collusion with the timers, to reduce unit labor costs unfairly.

General acceptance of methods and time study by organized labor is achieved today through frank discussions with management. In addition, trained labor representatives are now frequently participating in the determination of standard times. Current acceptance is based on management's feeling that standard times reduce costs and increase productivity, and labor's belief that through methods improvement the job is made easier, and that honest standard times permit the worker to increase his earnings. We shall return to this subject in Chapter 25 when we come to discuss labor's attitudes toward various wage plans.

Conclusions

Methods and time study are invaluable tools for both labor and management. The pressing need for increased production during two world wars has refined the techniques of this tool and demonstrated its effectiveness in operation. However, the problem of keeping quality compatible with huge production demands is increased proportionately to the "tightness" of the time standards.

Qualified methods-and-time-study engineers have demonstrated to business and industry how an analysis of methods and proper element times will more than pay for their costs. Labor's desire for better working conditions and properly determined incentive plans rests upon techniques that have been tested by experience.

Methods and time study are not completely scientific, but the trained and experienced judgment of qualified observers is fairly reliable. Their analyses have given both labor and management an opportunity for improving their respective expectations.

QUESTIONS

1. Why does a good job of methods and time study often lead to improved worker morale, in spite of labor's historical opposition?
2. What arguments would you use in trying to sell top management an incentive-wage plan based on methods and time study?
3. What is the relation between standard times and a balanced work force or machine loading, or both?
4. How would you explain the association of methods improvement to fatigue?
5. What is the relation of the therblig to micromotion analysis?
6. How can the simo chart be used to increase manual productivity and decrease fatigue?
7. Would you prefer the continuous or snap-back method of making stopwatch studies, and why?

8. Why is it that very brief elements, or motions, are inclined to be less accurate than those of longer duration?
9. Why do operators sometimes consciously hurry or slow their motions when being timed by a stop watch?
10. How are differences in skill, effort, consistency and speed of different operators adjusted to the average?
11. Would you select a "fireball" operator or one whom you considered of average speed for timing to establish standard operating times? What are the reasons for your decision?
12. Why are exceptional readings eliminated in calculating standard times for elements or motions? Would it make any difference in your decision to strike such times if you had decided to use the median in computing your average?
13. What effect do high- and low-time values have in determining the modal value?
14. How can plotting of the standard deviation aid in setting up incentive wage plans?
15. Would you prefer "tight" standards with high premiums, or "loose" time standards with lower premium pay in trying to foster improved productivity? What are the reasons for your choice?
16. How can the times of fast and slow operators be "leveled" to an acceptable average?
17. If an allowance of 10 per cent is to be made for worker fatigue and other personal reasons, how would you figure the adjustment of the normal cycle time?
18. How do you feel about the reliability of standard data (MTM) when used synthetically? Would it make any difference if such data were used for a series of elements comprising an entire operation? If so, how would you correct the suspected fault?
19. Do you believe that the use of synthetic times might cause trouble with the workers? If so, how would you obviate or overcome the trouble?
20. Are the suspicions of organized labor with respect to standard times justified? Has management been partly responsible, or is the suspicion simply based on the use of scientific techniques not understood by the rank and file?

CASE PROBLEM

Franklin Toy Company

Most large and medium-sized plants rely on methods and time-study engineers to analyze repetitive jobs and set standards of production. In smaller plants, however, although the work may be less repetitive, the need for setting operation-time standards remains, and must be taken care of by some member of management or the owner, if a specialist is considered too expensive. Such was the case with the Franklin Toy Company, where the responsibility was undertaken by the owner and manager, Robert Franklin.

Mr. Franklin was an interested student of business conditions, and felt that unless he was able either to increase sales or lower unit costs, he would be forced to lay off some of his men. The firm employed five production operators who did the identical work of cutting out, assembling and painting wooden toys. Although the quantity and quality of the materials, as well as the working conditions, were fairly well standardized, Mr. Franklin noticed that some of the toys were better assembled and painted than others, and that while some of the operators worked at an apparently normal speed, others seemed to be unnecessarily slow. He realized that if a worker turned out fifty of a given toy in a week, for $100, the unit labor cost was $2.00. If another turned out forty of these same toys in a week, for $100, then the unit cost was $2.50. In order to determine how many toys each of the five men was making, he kept a record of their production on the two types (A and B) of toys being manufactured that week, with the following results:

Number of Toys of Either Type Produced Per Day

	Bruton		O'Connell		Mathews		Pafko		Logan	
Day	A	B	A	B	A	B	A	B	A	B
Monday	4	4	3	3	4	4	2	3	2	2
Tuesday	4	5	2	3	5	4	2	3	2	2
Wednesday	6	6	6	5	5	4	4	3	3	2
Thursday	7	6	5	4	5	5	4	3	4	3
Friday	4	4	6	6	3	4	4	4	3	2

The data show that Bruton produced the most and Logan the least, but Mr. Franklin wanted to know the number which should be produced in a week by a normal worker. To get more information on the subject, he decided to work for a week in the shop under the same conditions as his five workers, and on the same toys. The results were as follows:

	Franklin	
Day	A	B
Monday	5	5
Tuesday	6	5
Wednesday	6	6
Thursday	6	5
Friday	5	5

Mr. Franklin was a skilled worker in this trade before starting his own business, and he realized that few employees would produce with the same interest as the owner-manager. He also realized that if the standard is set too high his men will become discouraged, and that if it is set too low the chance of improving performance will be very slim.

PROBLEM. Should the weekly production standards for Toys A and B be set at 28 and 26 respectively? If not, should the standard weekly production rate be set at 19.8 for Toy A, and 18.8 for Toy B, representing the simple average produced by the five operators for the week's work recorded by Mr. Franklin? If the standards for the production of Toys A and B should be some figure different from those mentioned above, what should they be, and why?

CHAPTER 18 *Quality Control*

High productivity, proper quality and low costs are the chief aims of management in many lines of business. The best equipment does not necessarily produce satisfactory results. Assurance of satisfaction often depends on some form of inspection for controlling the quality of a part, procedure, transaction or operation. Scientific inspection, or quality control, is a relatively new addition to scientific management. A new interest was taken in inspection after Eli Whitney discovered, at the beginning of the nineteenth century, the value of interchangeable parts for gun assembly. But in spite of this early demand for size standards, it was only after the Civil War that such an elementary inspection implement as the "go" and "no-go" gauge[1] came into general use. From this small and late beginning, inspection has advanced so rapidly in recent years by the use of technical equipment, advanced methods and skilled operators that scientific quality control has become as important in some highly technical industries as the production processes themselves.

Objectives of quality control

There are at least three primary objectives of quality control. The first of these stems from the realization that no machine ever produces two pieces that are exactly alike, and that not every piece is satisfactory. It is necessary, therefore, to separate the good from the defective pieces, a process which has become important enough to give rise to scientific inspection as a separate function in industry. Inspection must maintain the quality of the outgoing product at the standard fixed by specifications, however simple or complex these specifications may be.

A second objective, which follows sorting the useful from the defects, concerns the disposition of the defective lots. They should be separated into groups of those which can be made useful, or salvaged at reasonable cost, and those which must be disposed of as scrap.

A third objective of inspection, and historically the most recent, is to evaluate the methods and processes of production. When it is discovered that current methods are resulting in too high a proportion of unacceptable products, inspection then seeks to determine the causes for so many rejects and tries to find remedies.

---

[1] See page 358.

Another way of classifying the objectives of quality control is in terms of the things to be inspected. In manufacturing, these may include everything from the raw materials to the finished products — machines and tools, chemical and heat-treating processes, packaging, gauges of all kinds, salvage and scrap operations. Quality control is by no means restricted to manufacturing establishments, although it was here that scientific inspection techniques were first developed. In the nonproduction industries, too, inspection has become a significant aid in evaluating and controlling the quality of services rendered. In all lines of business and industry, inspection is continually used to insure customer satisfaction.

Quality standards

For purposes of inspection, the "quality" of a product refers to that quality or degree of accuracy, within prescribed limits of allowable variation, required by a set of specifications or instructions. The variation works both ways. For example, to use materials of a higher quality than is specified for a particular job is an unnecessary expense and, of course, materials falling below the quality standard are equally unacceptable. If quality standards are properly set, compliance with them will turn out a product or service acceptable for the prescribed purpose — no better and no worse.

There is the further problem of who should be responsible for setting the quality standards. It is customary for production standards to be set by conference among the sales, design and manufacturing departments. Under this plan, the role of inspection is to see that the standards are met. If, as occasionally happens, the inspection department sets the standards, it is in the position of passing judgment on its own work, which is not a healthy control situation.

It must be realized that quality is always relative to some norm. Specifications of quality represent the ideal, usually with allowable variations. How close quality control should adhere to the ideal is well expressed as that amount of variation in the desired characteristics which is as narrow as possible within practical and economical limits.[2]

Specifications

Standards are set forth in specifications. Specifications for products, or instructions for services, define the quality for the purpose intended. Because it is impossible to make two things exactly alike, or perform services in exactly the same way, tolerances of upper and lower limits are also specified as acceptable variations. The purpose of inspection is to determine whether or not the product or service is satisfactory according to the specifications or for the purpose intended.

---

[2] Ralph A. Hefner, "What Is Statistical Quality Control?" *The Journal of Industrial Engineering,* Vol. 2 (May 1951), p. 14.

In this connection it is pertinent to observe that occasionally those responsible for determining the specifications "play safe" by making the requirements more rigorous than necessary. For example, postwar investigations showed that many items rejected because of "tight" specifications were actually usable. Unnecessarily tight specifications always lead to higher prices both in wartime and in peacetime, but the fault is doubly serious during a war, when useless rejections leave the fighting forces in short supply. Most specifications are made by engineers, and it has been their professional habit to demand tight tolerances. Engineers should follow the physicians' practice of consulting with other members of their profession when accurate diagnoses and prescriptions are needed, so that critical and costly items will not be made inordinately expensive, and "acceptable rejects" will be given proper consideration.

Specifications present several important inspection questions:

1. Do they set up proper inspection requirements?
2. Which operations are important for inspection?
3. Are specified tolerances and other requirements necessary?
4. Will greater tolerances be satisfactory and less costly?
5. Will new processes improve quality?
6. Do inspectors understand the specifications?
7. What are the chief reasons for rejects?

When specifications are so drawn as to make inspection difficult, quality control is correspondingly lessened. Taste, odor and color are examples of difficult qualities to inspect with objective precision; in some cases, their inspection must be a matter of personal judgment. Many items, on the other hand, are specified by standard grades which are well recognized and accepted. Cocoa, for example, is specified by country of origin, and some metals are specified on the basis of their alloys. The performance, or engineering, test is specified in some fields. Precision is had at an unnecessary price where performance is satisfactory.

Types of inspection

The two chief types of inspection are remedial and preventive. The purpose of *remedial inspection* is to sort the acceptable items from the rejects. The purpose of *preventive inspection* is to determine the cause of rejects and correct them.

These two types are not mutually exclusive. It is true that a repetitive kind of remedial inspection, performed by semiskilled operators, would not be likely to result in suggestions for product or process improvements. Or, again, it would hardly be economical to set top-flight inspectors to work at slipping bolts into a gauge for eight hours a day in a routine process of sorting out acceptable items from rejects when their time might better be spent in a preventive-inspection program for seeking out the causes of rejects. But, as we shall see in the next section, preventive inspection can be remedial, and a good remedial inspection program should be alert to consistent sources of defects which might be eliminated in the operating departments.

How to Inspect

There are several standard methods of inspection, some of which include both the remedial and preventive approaches. The four most important methods are known as sorting, sampling, statistical quality control and engineering. Each of these will be considered in detail.

Sorting inspection

Sorting, or 100-per-cent inspection, is the separation of all defective items from any lot. It was used originally to detect defects in hand-made products. Even now, expensive or vitally important machine-made items may be inspected on a 100-per-cent basis. The tendency, however, is definitely away from this method of inspection. It is unnecessarily expensive in many cases, is naturally slow and not always reliable. It is the type of job that customarily requires close attention more than skill because of the many adequate tools used in the inspection processes. Because the inspector's job is not found in the high wage brackets, mediocre personnel tend to be recruited for the job. Finally, because the job is monotonous, fatigue tends to lower dependability of results. Routine sorting inspection gives reasonable assurance of high outgoing quality only at excessive costs.

Sampling inspection

To understand why the cost of 100-per-cent inspection is frequently excessive, consider the case of a manufactured product which is produced quickly and cheaply to be sold in bulk. Let us take, for example, two-inch finished nails, which have a retail value of twenty cents a pound, with roughly one hundred nails to the pound. Obviously, if every one of these nails is to be individually inspected for such characteristics as proper length and absence of burrs, it is going to cost the manufacturer more to inspect the nails than to produce them. Such a situation is intolerable. For inspection does not create quality; it merely aids in controlling it.

This kind of situation arises frequently in industry, not only in the manufacture of cheap finished goods for bulk sale, but just as often in the production of component parts. The manufacturer wants some way to guarantee reasonably high quality in his product without resorting to 100-per-cent inspection. He wants some method by which he can decide either to accept or reject a lot of a given product by inspecting only a *sample* from each lot.

In earlier times, the typical manager probably based his sampling inspection on a rule of thumb: "Try out a few items from each lot. If the items you select look pretty good, accept the whole lot. If there seem to be quite a few defective items in the sample, reject the lot." Such a system might work out very well in practice, or it might not. The inspector, for example, might not be using a large enough sample to give a reliable picture of the lot. Or again, he might be getting just as good results by using a sample one-half or one-quarter as large. The weakness of this approach lies in the fact that when a sampling system is not derived from mathematical laws of statistical inference, there is no way of knowing how much or how little a sample can tell you about the mass of items from which it is drawn.

As soon as a quality-control program turns from sorting to sampling, a number of questions arise and demand to be answered if the sampling system is going to be of any use at all. How large should the lots of items be? Given the lot size, how large a sample from each lot should be inspected? Finally, once the lot and sample sizes are determined, what is the criterion for accepting or rejecting a given lot? For example, if there are one hundred items in a lot, and a sample of ten is inspected from each, how many defectives can be allowed in that sample? If one item out of the ten is defective, should the whole lot be rejected? Or should the lot be rejected only if two or more, or three or more, items are defective?

It was to provide reliable answers to questions such as these that the scientific method of acceptance sampling was worked out by Dodge and Romig at the Bell Telephone Laboratories twenty-five years ago.[3] Other plans, such as the Military Standard 105–A and "Sampling Inspection" as developed by the Statistical Research Group at Columbia University, have subsequently been devised and put into practice. The present discussion centers around the Dodge-Romig system, which is in widespread use today among all kinds of industries where sampling inspection is needed.

Acceptance sampling is based on the laws of probability. Ideally, we should like to know everything there is to know about the quality of a lot of items from the evidence of a sample. But the only way to do this with certainty is to inspect each item in the lot. If there is only one defective bolt in a lot of 1000 bolts, there is always that one chance in a thousand that we should not discover it until after we had inspected the other 999. Probability sampling represents a compromise. It does not tell us how many defectives there will be in any given lot of items. It does tell us, however, that if we inspect a great many lots, with a fixed sampling plan and with a specified criterion of acceptability (for example, a manufacturer may decide to call a keg of 10,000 nails acceptable if not more than 3 per cent of them are defective), then x per cent of the time — let us say 95 times out of 100 — a lot that passes the sampling test will be "acceptable" by the definition agreed on and only 5 per cent of the time will unacceptable lots be getting by.

---

[3] Harold F. Dodge and Harry G. Romig, "A Method of Sampling Inspection," *The Bell System Technical Journal* (October 1929), p. 628. An elaboration of this article by the same authors is *Sampling Inspection Tables* (New York: John Wiley & Sons, Inc., 1944). No attempt will be made here and in the following section on statistical quality control to give a mathematical presentation of the statistics involved. The discussion focuses instead on the applications of statistical method and on the kind of inferences which statistics permits. The student who is interested in the underlying mathematics will find a simple and excellent presentation in Norbert L. Enrick, *Quality Control* (2nd ed.; New York: The Industrial Press, 1954).

Notice that this process of acceptance sampling leaves two important decisions up to the manufacturer (or whoever is responsible for setting standards of acceptability). He must decide (1) what proportion of a lot of items can be defective and still be considered acceptable and (2) what proportion of the time he can allow an "unacceptable" lot to get by the inspection station. Obviously, the answer to these two questions will vary with the value of the item itself or with its importance in a production process. There are many instances in which the savings to be gained in the inspectors' time make it most economical to allow a relatively high proportion of defectives to get by. But the important point to be made here — what distinguishes scientific sampling from rule-of-thumb methods — is that once the standards of quality have been decided upon, the manufacturer can read off from the Dodge-Romig tables the proper lot and sample size and the number of defectives allowable within the sample to be reasonably sure that for x per cent of the time, only acceptable lots will pass inspection and unacceptable ones will be rejected.

As soon as a sampling plan has been adopted, quality control must see that it is adhered to. The plan may be to reject a lot if three or more of a sample of fifteen items are defective. If an inspector finds three defectives, but decides that the whole lot "looks pretty good," draws a new sample in which there are only one or two defectives, and thus accepts the lot, eventually a much larger proportion of unacceptable lots is going to get through and, furthermore, there will no longer be any way of estimating how many bad lots are slipping by.

Another important caution is that acceptance sampling demands that the sample be a random one. If an inspector always picks up, say, the first ten items of a lot, he may be consistently rejecting lots that are really acceptable. Perhaps in this case the machine-operator who makes the items takes a few minutes to "warm up" each morning and, after turning out four or five defectives at the start, goes on to produce hundreds of perfect items for the rest of the day.[4]

Acceptance sampling, as we have just described it, is a form of remedial inspection. If the program is well supervised, then roughly the same proportion of unacceptable lots is always going to get *by* the inspector. However, the ratio of acceptable to unacceptable lots turned up at the inspection station may vary a great deal. When the sources of defects in the items are not random, one should expect a rise in the number of lots being rejected, and this — as in any inspection program — is the warning signal for quality control to seek out these sources of error and suggest remedies to eliminate them.

---

[4] At the same time, in dealing with machine-made items, it is important to inspect an initial short run to be sure that the machine is properly adjusted. If machine-made items are inspected during operations, at relatively short intervals in the beginning, and found satisfactory, then the length of the interval may be gradually increased as long as the product is continuing satisfactory.

Statistical quality control

Statistical quality control is a form of preventive inspection. Its purpose is to observe and record all variations from fixed standards of quality, in the hope of discovering the causes of undesirable variations or defects and eliminating them.

"Quality," as used in statistical control, refers to those characteristics of an item which can be measured in accordance with a set of specifications. The specifications will include not only the ideal, or norm, but the range of allowable variation about the norm. In production, quality may refer to a number of characteristics, such as kind of material used, size, color, strength, weight and a great many others. The degree of quality necessary varies with the nature of the product. An automobile-engine piston, for example, requires more exact adherence to the specified norms than a lawn sprinkler. The "tolerance," or allowable variation from the norm, will be greater for the sprinkler than for the piston.

No two manufactured articles are ever exactly alike, in spite of references to interchangeable parts. For a number of reasons, variations are always present. Cutting tools become dull by a slow process of attrition and machine setups may change imperceptibly as the setscrews wear or become loose. So it is that some degree of variation is always present. The object of statistical quality control is to hold these variations under control within acceptable limits.

The Control Chart. Since variation is always going to be present, the problem for the quality-control specialist is to draw the line between those variations which can be thought of as "normal" and those which deviate dangerously far from the norm. Here the control chart has proved to be a very useful instrument.

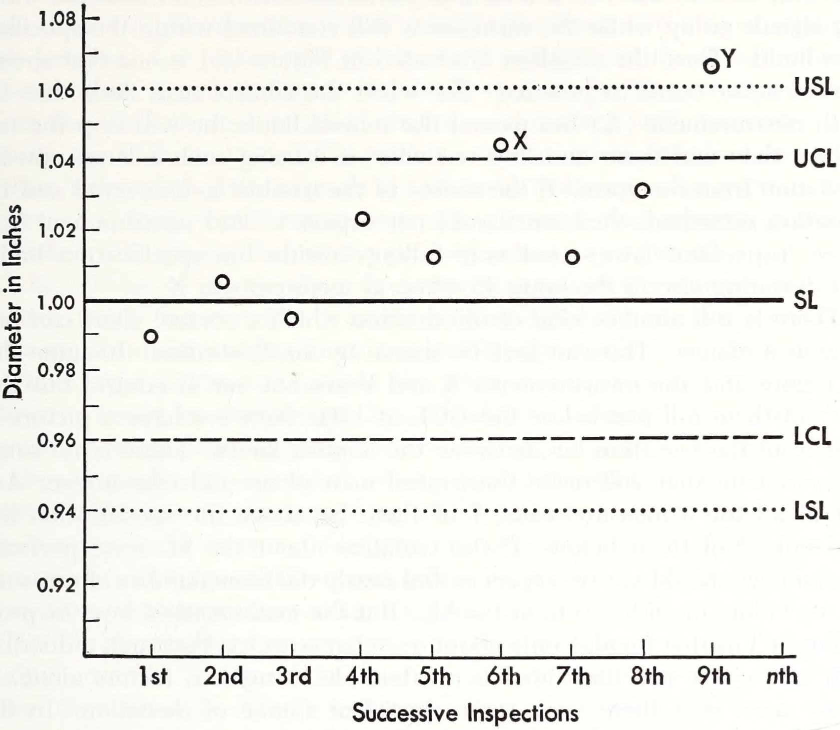
A simple form of control chart is shown in Figure 18.1. For the sake of concreteness, let us say that this is a chart illustrating successive inspections of brass joints coming off the same machine. The specified diameter of these joints is one inch. In Figure 18.1, a *solid* line is drawn across the chart at 1.00, representing the specification line (SL). Let us say further that the specifications have set .06 of an inch as the amount of allowable variation. Thus, counting off six hundredth-inch units from either side of the SL, we draw a *dotted* line across the chart at 1.06 to show the upper specification limit (USL) and another one at 0.94 for the lower specification limit (LSL). The *circles* represent the diameters of joints selected for inspection at half-hour intervals.[5] In this case, of the nine joints inspected,

---

[5] Or, more typically in practice, each circle would represent the *average* diameter of an inspection sample of from three to five joints.

FIGURE 18.1

Sample Control Chart



only one of them (Y) falls outside the specification limits, its diameter being slightly over 1.06 inches.

Falling between the specification line and the upper and lower specification limits are two *dashed* lines, called the upper control limit (UCL) and lower control limit (LCL). It will be noticed that these are only .04 of an inch away from the SL. In other words, for control purposes the diameters must fall within a narrower range than that set by the specification limits. Whenever a measurement falls beyond the control limits — even if it is acceptable as measured by the specification limits — the control man is warned that here is a situation that must be investigated.

The variation that occurs between the UCL and the LCL is generally of the type referred to as *chance* or *random* variation. For each deviation from the norm (in this case, the SL of 1.00 inch) there is always some reason, but when these deviations all cluster about the norm and, hence, all the items are acceptable, it is not worth the time and effort to seek out those reasons. On the other hand, measurements falling beyond the control limits are thought of as variation due to *assignable causes.* They indicate that the situation is very close to getting out of control and serve as a signal for the control specialist to halt the production process and find out what is causing the deviation.

It will be seen that this is a form of *preventive* control, because the warning signals go up while the variation is still contained within the specification limits. Thus, the situation illustrated in Figure 18.1 is one that should almost never occur in practice. For when the control man finds that the sixth measurement (X) has passed the control limits, he will stop the machinist then and there and find out what is causing such a large upward deviation from the norm. If the source of the trouble is discovered and the situation remedied, then we should not expect to find measurement Y — three inspections later — not only falling outside the specification limits, but deviating also in the same direction as measurement X.

There is still another kind of information which a control chart can provide at a glance. This can best be shown by an illustration. Imagine that in Figure 18.1 the measurements X and Y are not out of control but that both of them fall just below the UCL at 1.04. Now we have a picture in which all the variation lies between the control limits. There is no single measurement that will make the control man sit up and take notice. And yet of all the 9 measurements, 7 of them lie above the specification line and only 2 of them below. If the variation about the SL were perfectly random, we should always expect to find nearly the same number of measurements falling on either side of the SL. But the mathematical laws of probability tell us that there is only about one chance in ten that such a distribution as the one just illustrated is attributable to random factors alone. It looks more as if there were some consistent source of deviation. In this instance it might be that the machine is slightly out of line so that the average joint coming off the machine is 1.02 inches.[6] Once again, the control man is alerted, from the evidence of the control chart, to take remedial action before the situation is actually out of control.

The Statistical Tool. In the two examples just presented, the story is told by a mere glance at the chart: a measurement either lies within or without the control limits; the variation either is distributed evenly about the specification line or it is not. Simple as they may seem, both kinds of analysis are grounded in mathematical laws of statistical inference.

Nothing has been said yet about how the upper and lower control limits are set. There is more than one accepted method of fixing these limits. One of the most common of these employs the *standard deviation*, a numerical measure of the average range of variation in any set of measurements. This statistic tells us that, when all variation is random, approximately two-thirds of the measurements will lie between the area from one standard-deviation unit above to one unit below the average. Another 30 per cent of the cases will fall in the area between one and two standard-deviation units away from the average.[7] With this information at hand, the control man can fix control limits for a given process with a reasonable assurance of how often a measurement will fall outside the limits — if the variation is truly random. Let us say that the standard deviation of the distribution of measurements shown in Figure 18.1 is .02 of an inch. Then there are only about five chances in a hundred that a measurement will "normally" fall outside the UCL and the LCL, which are placed two standard-deviation units to either side of the average of 1.00 inch. Such a measurement as X in Figure 18.1, then, would surely be warning enough that something should be looked into quickly before the process gets out of control.

---

[6] Strictly speaking, the variation about this new mean average may still be *random;* the important point for the control specialist here is that the *mean* measurement has shifted.

A knowledge of the standard deviation is useful to the control specialist in other ways. For example, it might be found that the standard deviation for joint diameters coming from a machine supposedly identical with the one illustrated in Figure 18.1 was .04. This would mean that one-third of the joints could be expected to fall outside the control limits and would give ample indication that something was wrong — either with the machine, or the operator or the materials used. Again, it might be found that the standard deviation of products from all the machines was so great that the specification limits were not likely to be met more than two-thirds of the time. Such a finding would suggest either a relaxing of the specifications or a complete revision of the production process.

The above examples give some idea of the use of the statistical method in quality control. Statistical analysis of the variations indicates whether or not they are large enough to be subjected to control by removal of the causes. In the absence of statistical control this decision is made by the specialist in the production processes concerned. Statistical control substitutes an objective decision for the production specialist's subjective opinion. With the aid of statistical control, the person in charge of quality control should be able to reach his conclusions without specialized knowledge of the processes concerned. His objective conclusions are superior to the experienced judgments of the production specialist.

Control of quality by statistical methods is not only more dependable than the opinion of the production specialist, but it is also less expensive. After a manufacturing process has been brought under statistical control there is less need for inspection, thus reducing costs and improving quality. Furthermore, statistical quality control is frequently used as the basis for improving processes which the production specialist has accepted as satisfactory. It is also important to realize that the application of statistical controls to many processes can be handled by capable foremen after a reasonable amount of instruction.

Statistical Control in Nonproduction Industries. Statistical quality control was first applied to the production of machine-made articles and is still used predominantly in that field. However, there is an expanding use of this method for controlling the quality of *methods* or *practices*. Recently, statistical quality control has been applied with success to improving the quality of service in merchandising. For example, a statistical analysis may be made of past merchandising errors in kinds, quality, color and size. Customer-contact errors include such items as pricing, billing and delivery, including delivery time. Statistical analysis points out the types of prevalent errors and the frequency of their occurrence; in some cases, even the cost of such errors may be calculated. Analysis leads to inquiry about the probable causes of errors, and plans for their correction. Approached in this manner, the field for quality service control has wide application in wholesale and retail business management.

---

[7] This will be recognized as the "normal distribution," already described and illustrated in Chapter 17, pp. 336–338.

Statistical quality control techniques have been applied with dispatch and profit to the operation of the mail-order section of a large store's dress department. In this case the ratio of the section's overhead to sales led to a statistical analysis. The report showed the probable cause. Because the section manager was paid a base salary, and a bonus figured on volume of sales, mail orders were not filled accurately. If the customer's color, size or price was not available, the section manager used his judgment in filling the order, thus adding to his bonus volume. The method and extent of this practice were exposed by the analysis. The excessive overhead was caused by the large number of "merchandise returns." The remedy might be found in a new section manager, or a new plan for figuring his bonus.

Use of Statistical Control. Adoption of statistical quality control has been slow among producers. The word "statistical" has set up a fearful hurdle which prevents many firms from even trying this technique. The statistical part of the method is overemphasized. Once the statistical design for analysis has been worked out, the analysis can be applied without a technical knowledge of the statistics that underlie the design. During the war the federal government set up ten-day courses covering the subject. Since the war, a number of schools have undertaken such instruction on a ten-day basis. The technical part of statistical quality control employs theorems that have been used by statisticians for a long time.

Engineering inspection

The term "engineering inspection" refers to the observation and testing of a product (or one of its components) in action to determine whether or not it will perform in accordance with the specifications for its operation. This is sometimes called the "use test." For example, the engineering inspection of an airplane ready for delivery to the military is made by representatives of the manufacturing company and the branch of service concerned, in actual flight. The plane's general performance will be observed and all its equipment will be tried out before acceptance by the purchaser. Delco Products, a subsidiary of General Motors, makes the final or engineering test of its small motors in action. As each motor is finished on the assembly line, ready to move to the shipping department for packing, it is connected electrically and continues its journey in actual operation. If it fails to function properly, it is put to one side when it reaches the packing department.

Another phase of engineering inspection — a special case of the use test — is the "destruction test." An automobile tire may be run under simulated road conditions until it blows out. Load factors and simulated distance traveled are noted on dials and transferred automatically to charts. This type of inspection is a form of sampling. It would be unreasonable to destroy an entire lot to determine its qualifications in operation. On large items this form of inspection becomes very expensive. For example, the Air Force, in its laboratory at the Wright-Patterson Air Force Base in Dayton, Ohio, performed a destruction test on many different aspects of a B–36. The purpose was to determine the capacity limits of the plane and its components under various conditions. It was assumed that the results obtained would apply to other planes of the same quality made by the same manufacturer.

Further Aspects of Inspection

The inspection process

There are two important considerations in connection with the processing of inspection. One has to do with its planning, and the other with cooperation. Irrespective of when, how or where the inspection is made, it should be planned so as not to interfere with production. Inspection is auxiliary to the maximum productivity of acceptable commodities. Therefore, careful planning for the expeditious transfer of inspected items from one operation to another is important. Modern material-handling techniques may well be given consideration for accomplishing this purpose. The handling of defective items must also be provided for. Proper planning will account for the prompt removal of rejects to the place where they are either salvaged by reworking or consigned to the scrap section for disposal.

Every effort should be made for close cooperation between those engaged in inspection and production. Although it may not always be within the power of inspection personnel to guarantee cooperation with machine operators and their foremen, nevertheless inspectors should be trained to take the first step in trying to achieve harmonious relations. This does not, of course, include catering to production's objections when a defective operation is discovered. When inspecting is done at or near the processing, reasonable accommodations free from unnecessary noise and vibration should be furnished. In many cases the inspector is responsible to his inspection superior but is working in territory over which the production foreman has jurisdiction. For this reason, and the fact that the inspector is passing on the work of those surrounding him, he must develop a cooperative spirit with the manufacturing department to obtain his own maximum efficiency, which should result in high productivity of acceptable products.

Extent of inspection

The extent to which inspection should be carried depends on the circumstances and should be determined by common sense. If the item to be inspected is expensive or crucial in the production process, then the inspection should be carefully supervised. The same is true if the item concerned is being produced by skilled labor. If, on the other hand, the product is being made on automatic machines, inspection may be reduced after it is found that the product is coming off the machine in a satisfactory condition. In fact, in such circumstances the inspections made may be spread at continually greater intervals in the process as continuous quality standards are being maintained.

There can be too many inspections as well as too few. Unnecessary inspections may tie up production, and too few may result in too many rejects. In either case, the costs of production are exorbitant. A continuous procession of perfect production is impossible, so the decision should be to do whatever is necessary to maintain the prescribed quality standards. This decision must be made in terms of the circumstances in individual cases, after the facts are known.

Where to inspect

Inspections can be made either at some centralized inspection crib or on the production floor. The *advantages* of the centralized inspection crib are:

1. The inspection can be done more effectively and quickly because of the superior equipment available.
2. Cheaper help can be used because of specialization in the work, more inspection equipment and closer supervision.
3. Control is better because of the opportunity to keep records.
4. The possibility of connivance with operators is reduced since the inspectors do not know whose work is being inspected.
5. Working conditions can be better regulated. In some cases atmospheric and other conditions must be kept under close control.

On the other hand, there are *disadvantages* to centralized inspection:

1. If products must be taken from the line for inspection and then returned, an excessive amount of material handling and inventory results.
2. Costs are increased when heavy products must be hauled to the inspection crib.
3. Unless responsibility is fixed for moving items expeditiously to and from the inspection crib, they are likely to pile up there, with the possibility of creating production bottlenecks.

Floor inspections are of two types. They may be made at fixed stations in the production line, or at random locations by roving or patrol inspectors. Inspection at fixed stations on the production line permits the selection of locations where important processes are going on. It reduces production costs by removing defective items before they have accumulated unnecessary expense. It has the further advantage of allowing the inspector to become highly proficient on a small and repetitive job. At the same time, the fixed-inspection-station plan may encourage favoritism toward some operators, to the detriment of quality. This tendency is increased when the operators are on a piecework basis.

Roving inspectors may be used in either a job shop or on a production line. They must be more proficient than station inspectors. They must know all about the product being made on a line, or the multiplicity of orders that may be worked on in the typical job shop, together with the quality standards required for various jobs.

The chief advantages of the station and roving inspectors are their noninterference with the production processes and the absence of material-handling costs in connection with their work. On the other hand, the quality of their inspections cannot be so dependable as when done in an inspection crib.

Inspection may also be done on a departmental basis, where either the floor or centralized plan may be used. The quality of inspection is likely to be superior on a departmental basis, with the further advantage that quality, as well as quantity, can be put on a competitive basis, with the number of defects produced serving as the evaluative criterion.

Some products, such as small motors, may be inspected at the wrapping center. Raw materials are often inspected by the buyer at the vendor's plant.

When to inspect

It frequently happens that the "where to inspect" is determined by "when to inspect." In other words, the location of inspections may be determined by factors other than convenience, or quality of the results. The chief of these "when" factors are:

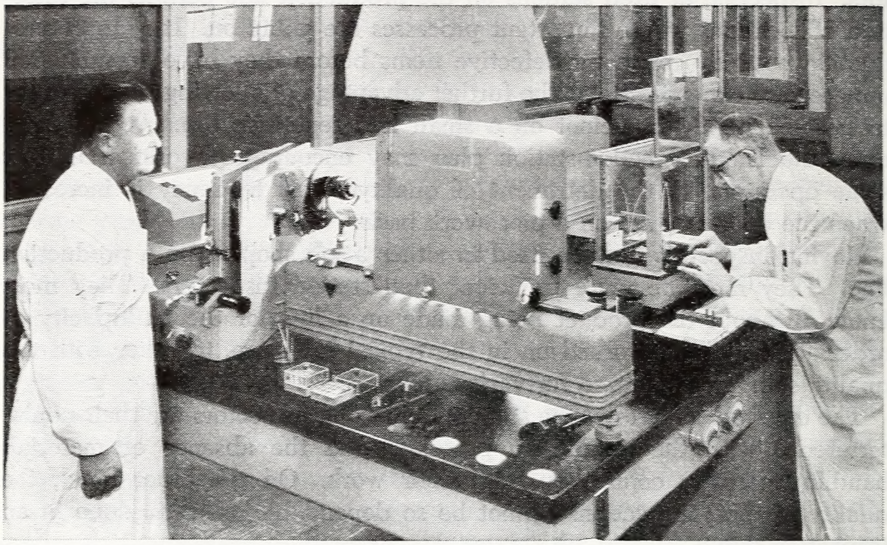
1. At the beginning of the production process, when materials, tools and gauges must be checked.
2. At those points in the production process where failures would be costly or hidden.
3. When work-in-process is transferred to another department.

Inspection Tools

Early inspections were doubtless visual, a method still practiced to a large extent in some businesses. In certain phases of sheet-steel production it is the practiced eye that determines which sheets shall be marked with

FIGURE 18.2

Spectrographic Analysis of Metals



Courtesy: Electric Storage Battery Company

the stamp of approval. However, visual inspection is rapidly giving way to inspection tools which have hastened and improved the process. A mere enumeration of some of the outstanding tools will serve to indicate the rapid progress being made in this field:

Go and no-go gauges
Working gauge
Master gauge
Snap gauge
Plug gauge
Profile gauge
Electric eye
Micrometers
Photoelectric cell
Industrial X ray
Thermocouple
Stroboscope
Induction gauge
Photoelasticity
Reflectoscope
Multigauges

Because repeated inspection for measurements is so slow with micrometers, the "go" and "no-go" gauges were developed to speed such operations. The acceptable item must slip snugly into the "go" gauge, but not fit into the "no-go" gauge. This type of gauge may be used by the production worker, in which case it is referred to as a working gauge. There are also master gauges used to check the working or inspection gauges. The common complaint about "go" and "no-go" gauges is that they lose their testing qualities quickly through wear, a defect which is being minimized by the use of new alloys.

The plug gauge is inserted into holes to find out whether they meet size specifications. Frequently the two ends of the plug represent the maximum and minimum dimensions allowed. The profile or contour gauge is a form of template which measures the perimeter of the inspected product by superimposed comparison.

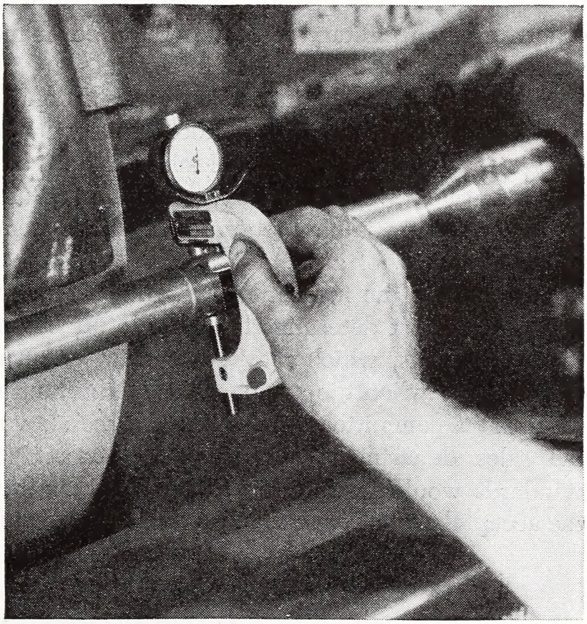
There is a growing group of automatic inspection devices. The electric eye, for example, is used in production lines for rapid detection of defects. "The photoelectric cell has . . . been used to grade such products as beans, to sort raisins at the rate of 1,000 per minute, to select electrical resistances, to control enamel thicknesses on wires, to check the level of the contents of a tank, to control the filling of bottles, and to locate fine cracks in metallic surfaces." [8]

The industrial X ray has a wide range of testing uses. It is used in foundries to examine the quality of "test bars" drawn from a heat, as well as for testing completed castings. These subsurface tests detect flaws which might not be known otherwise until the casting failed in use. Such testing is carried to great lengths on many kinds of airplane engine castings. The thermocouple is another electrical device, used to measure high temperatures. The stroboscope measures the deflections of rapidly moving particles.

The supersonic reflectoscope tests metals and other materials by means of high-frequency vibrations. The advantage of this equipment is that it frequently eliminates the need for testing to destruction. The reflectoscope

FIGURE 18.3

Snap Gauge



Courtesy: Federal Products Corporation

---

[8] Lawrence L. Bethel and others, *Production Control* (New York: McGraw-Hill Book Co., Inc., 1942), p. 159.

is reported to have located defects in forgings and castings up to ten feet in depth.

A recent development is the mechanically controlled multi-inspection gauge for testing a number of qualities almost simultaneously. Of one of these machines the manufacturer writes: "At a speed of 3,000 plus per hour, this conveyor-fed multi-inspection gauge measures and sorts piston pins for hardness, triangular out-of-round, taper and diameter along the full length of the work piece. The pins are automatically sorted into ten disposal units: out-of-round tolerance, .00005″; taper tolerance, .0001″; hardness, o.k. and bad; diameter, five groups of .0001″ difference, plus over and under." [9]

Organization for Inspection

Organization for the control of quality through inspection depends on the degree of quality required, which is influenced in turn by the intricacy and value of the product. It might be justifiable in cases of low value and loose tolerances to have inspection supervised by the production foreman. This is unusual because of the feeling that an operating foreman will tend to pass over defects in his products. Where quality is relatively important, the chief of inspection may report to the production superintendent. Where quality is very important, the chief inspector should report directly to the works manager or some other superior to the production superintendent. These three grades of inspection supervision merely indicate three steps in the importance of quality. When the quality demanded is of the highest order, or when military secrecy is required, it may be advisable to have a vice-president responsible for inspection.

Another phase of the inspection organization is the handling of defective items. It is customary for questionable work to be turned over to the chief inspector for disposal. He may decide that it has only scrap value, or that it can be reworked at a saving. A typical organization will provide for some form of special inspection for reworked items before they are assigned to the main flow of acceptable work.

Customarily, the inspection department is responsible only for checking products against determined standards. It has nothing to do with setting those standards, which may come from engineering, research or design. Occasionally when the standards are important and exacting, they may be set up by a committee representing all the above-mentioned activities, plus the sales department and some top executive. Suggested changes in standards would be referred to such a committee, as well as questions of the acceptability of expensive products about which there is a dispute.

Conclusions

Quality control does not add to the money value of products. The same conclusion applies with respect to quality control of all kinds of services, which can be just as defective as manufactured products. But the utility value of both products and services can be materially increased by meeting the desires of customers. Utility values lost to goods or services reduce purchaser demand, and may eventually lose the customer. These factors demonstrate vividly the value of adequate quality control to the producer and to the concern selling its services. The requirement for the future of quality control in both cases is more dependable inspection at reduced cost.

---

[9] Federal Products Corporation, Providence, R.I.

There is no method for guaranteeing perfect inspection results at the present time, nor will there be one until automation reaches the stage of automatic correction of its mistakes for producers, and a yet unknown plan is devised for assuring correct filling of orders by distributors and service agencies.

Since quality control creates costs that ordinarily cannot be recouped in selling prices, it is important that it not only be dependable, but also a reasonable expense. One way of achieving this latter purpose is to see to it that the type of quality control used fits the circumstances involved. The inspection of lawn-mower gears suggests a different method from that of piston rings. Furthermore, there is the problem of the tightness of inspection in many fields. Engineers who normally provide the specifications for bridges, for example, have had some much publicized failures in use, a type of experience that has led to unnecessarily careful specifications in many cases.

Many quality-control costs will be reduced in the future as new inspection tools are used to replace manual inspection. As the mechanical inspection processes improve, both the quality and quantity of inspection will be improved and its costs decreased. In addition, as more ways are found to reduce human fatigue, there will be a decline in the number of inspection errors and, consequently, in the cost of the usable products.

Future writers will probably have much more to say about the quality control of services. The subject was not even considered until a few years ago, and is probably not yet discussed in textbooks.

Finally, in the fields of production and distribution an improved cooperation must be developed between those who make, distribute and serve on the one hand, and those who protect the quality of goods and services on the other. The line and staff services of this duet will have to overcome some of their jealousies while we are waiting for improved mechanized controls of quality.

QUESTIONS

1. Why do we refer to inspection as quality control, and what is its primary purpose in production or merchandizing?
2. How can the inspection process contribute to the improvement of methods?
3. What does "quality" mean in relation to inspection, and who should be responsible for setting quality standards?

4. How are specification tolerances applied to inspection? In what way can "tight" tolerances sometimes add unnecessarily to production costs?
5. Does remedial or preventive inspection usually cost more, in your opinion? Would your answer be different if you were considering costs from the short- or long-term point of view?
6. What reasons would you give for supporting the sampling method of inspection rather than the sorting or 100-per-cent plan?
7. Would the results of 100-per-cent inspection be improved if a second line of inspectors checked the work of the original inspectors? What do you think would be the probable result?
8. Give some examples of the various lines of business where you believe that statistical quality-control techniques could be used to advantage.
9. Why is it that the quality-control specialist is not interested in random or chance variations?
10. How can the detection of assignable causes for important variations lead to improvements in processes, methods or procedures as they may be encountered in nonproduction concerns?
11. Why is it that the control specialist is interested in the quality of products even when they are within the upper and lower specification limits?
12. What are two methods of engineering inspection?
13. Why is it so necessary to develop cooperation between the inspection and production groups in industrial concerns?
14. What are the relative advantages of centralized and roving inspection?
15. Would you allow any kind of inspection to be under control of the production department making the product? Support your conclusion.
16. To what extent would you consider the results of automatic inspection devices superior to 100-per-cent checking by trained inspectors?
17. Under what conditions would it be reasonable to allow the inspection department to participate in setting quality standards?

CASE PROBLEM

PUTNAM TOOLS

Putnam Tools is a medium-sized privately owned company, founded by its present owner thirty years ago. Until five years ago, Roger Putnam supervised and controlled all phases of the business, including finance, production and sales. He always felt that it should be his responsibility to coordinate activities while the business was small. Mr. Putnam was originally a tool-maker by trade, with three years experience selling machine tools immediately prior to establishing his present business, which produces hand tools for machinists.

The tool line grew gradually with the concern until five years ago. Since that time, the business has grown very rapidly, and the line of tools has kept pace with the general expansion. At the time of the owner's semi-retirement, in the midst of the expansion program, the organization was put on a more functional basis, with delegated authority fairly commensurate with the assigned responsibilities. That is, the treasurer now has complete charge of finances, the director of sales operates and controls his activity, and the superintendent of production has control of the production side of the business, including the engineering department.

The various activities are coordinated by a general manager, acting as assistant to Mr. Putnam.

The company has built a reputation for quality tools, which was relatively easy when the employees numbered fewer than 25. At present, operations are largely on a production basis, with 175 workers, most of whom are semiskilled machine operators. The jigs and fixtures for operations on the cheaper grades of tools are made by machinists. The company's line of gauges is made by highly skilled workers, to precision specifications.

With the more elaborate line, and production ten times greater than it was five years ago, difficulties are developing with inspection of the products. Customer complaints have led to some friction within the management group concerning control of inspection. The *chief of production* maintains that all inspection should be under his direction and control. The *head of engineering* contends that inspection is a natural function of his activity. The *director of sales*, who feels a keen responsibility in the matter, wants a separate department for inspection, with its chief reporting to the general manager. The general manager, who is trying to resolve the difficulty, has an open mind about the matter, but is somewhat confused by the seemingly logical arguments of the three contenders.

In analyzing the situation for the general manager, the head of engineering has pointed out that the total line of products can actually be divided into three categories as far as the difficulty and care of inspection are concerned. Such items as hammer heads, cold chisels and iron clamps do not have exacting measurement specifications. Their metal must be free of flaws, but that kind of inspection has always been made on a sample basis by engineering as the raw materials are received. A second group of products, such as dividers and calipers, require closer inspection to secure their accuracy in use. The third category would include the entire line of gauges and similar items, which must be made to very close specifications and accuracy.

The general manager is impressed with this engineering analysis, which appears entirely objective. In addition, he would like to be relieved of direct responsibility for the inspection activity, which he feels is technical and represents a field in which he has had neither training nor experience. The *general manager* is inclined to have all inspection done by engineering, holding them directly responsible for the control of quality, while he reserves authority over engineering's administration and management of the function.

All four of the proposals have been submitted by the general manager to the interested group, requesting their choices in writing, together with reasons for their decisions. He also asks specifically for the reasons against his own proposal, as well as against the other two plans which each of the men must necessarily oppose.

PROBLEM. If the general manager called you in as a consultant on this organizational problem of the inspection function at Putnam Tools, which of the four plans would you favor, and why? If you have a suggestion different from all four plans submitted by the group, what is it, and why do you think it is superior?

CHAPTER 19

Inventory Control

Management has, or should have, many types of control. Inventory control ranks with budgetary, production and sales controls, which together make up the important measuring rods. Inventory control, sometimes referred to as material control, has several objectives, of which the most valuable are to maintain quantities of materials, supplies and components necessary to meet sales commitments, to coordinate with the production program, and to hold inventory investment in line with company policies. The five classes of materials which should be subject to planned inventory control are raw materials, components or parts, supplies, work-in-process and finished products.

The way in which it acts as a management *control* is by maintaining a balance of raw materials, components and supplies in order to provide an even flow of production and assembly, or sales. This objective naturally leads to a program of rational purchasing, which means not only having inventory items when and where needed, but which also presumes sufficient negotiating time for buying the right quality at the right price. Inventory control and purchasing are so closely related that in some companies the procurement function is responsible for inventory control and central stores.

Although the functions of the inventory-control section will vary with the nature of the enterprise and the particular organizational structure, it may be responsible for any or all of the following activities:

1. Planning for a future period, based on the production cycle, the sales program and market conditions, in order to maintain an adequate production or sales program and thereby meet sales obligations.
2. Translating inventory planning into a feasible purchasing program.
3. Receiving goods for stores inventory or for immediate transfer to production centers.
4. Inspecting quantities and condition of materials and checking them against nontechnical specifications.
5. Storing and issuing of raw materials, components, parts, supplies and finished products.

6. Record-keeping for stores items.
7. Supplying information for materials costing and other data used for the financial accounting of inventories.
8. Salvaging or scrapping, and disposing of defective products.
9. Recommending items for standardization and substitution.

Control factors

The elementary factors used for control of inventories are:

1. Classification of inventory items.
2. Proper arrangement of storage facilities.
3. Perpetual inventory records.
4. Adequate cost system geared to company policy.
5. Recording of inactive, obsolete and damaged items.

These five elements of material control can be summarized as: classification, planned storage, perpetual inventory, costing, and reporting of items requiring the attention of top management. The other functions of stores can be thought of as service rather than as control activities.

Inventory organization

The number of inventory control's organizational relationships is evidence that it is a comparative newcomer to the fold of scientific management. Its newness is only one of the reasons for its unsettled place in the organization structure. Another is the shifting influence of other activities or functions, often considered more important, to which inventory control has become attached as a subordinate. A third, often based on rational considerations, arises from the nature of the association between inventory control and the organizational unit to which it is assigned.

Inventory control may be found reporting to purchasing, central stores or the superintendent of production. A large manufacturing enterprise may assign inventory control to production if materials represent a very large proportion of its expenditures.

✓ In other cases, inventory control may be set up as an independent unit, reporting to the executive vice-president or even to the president. This is frequently the case with a chain of supermarkets where inventory is by far the outstanding expenditure. The chain may have large central stores reporting to the person in charge of operations. Since the importance of inventory control in such cases ranks after purchasing and sales, it is customarily independent of central stores from both supervisory and physical standpoints. In fact, the actual inventory records will probably be located in the concern's office building and locked whenever the inventory chief is absent. This type of setup is due not only to the large investment involved, but also to the frequency of loss through pilfering of the thousands of small items used in home consumption. Furthermore, one of the top executives always advises closely with the buyers in determining quantities, for which inventory control is a valuable guide.

Occasionally, inventory control is placed under supervision and control of central stores. There are also cases, as has been mentioned, where purchasing has charge of both central stores and inventory control.

Because the position of inventory control in the organization structure varies so much from company to company, no attempt will be made in this chapter to single out any one organizational arrangement as the most typical or the most desirable.

Inventory problems

Inventory control should report to engineering, production and purchasing about any materials and parts which it considers unnecessarily expensive for the uses to which they may be put. Although discovering materials and parts of improper quality is not normally one of its assigned functions, nevertheless inventory control can often aid procurement and engineering in solving this management problem, which is customarily resolved by discussions between these two departments.

Excessive and inadequate inventories are both costly conditions, and sometimes so serious as to attract the attention of top management until a proper equilibrium has been restored. Inadequate inventories may halt operations completely. Excessive inventories may be almost as disastrous to profits, especially on a falling market. Proper inventory control should minimize the management problem in this area.

Inventory accounting has a direct relationship to cost accounting in reporting materials that have been issued for customer or production orders. To the extent that costs involve direct and indirect materials, the validity of cost-accounting analyses is dependent on proper inventory control.

Advantages of inventory control

In view of the activities and problems of inventory control, what advantages does it offer to management?

1. *It promotes buying economies by determining requirements scientifically, modified by experience and market conditions.* Controlled inventory first eliminates the crude method of ordering only after classified materials are exhausted. It not only plans buying on time for use, but also guides the quantity of purchases by such factors as the production cycle, quantity prices and market trends.

2. *It prevents duplications in ordering for stock by centralizing the source of requisitions for purchase.* By recording purchase orders, acquisitions and stores issues, the perpetual inventory record poses an automatic stop signal against duplicate purchase orders. Such a signal should be effective in central stores as well as in the inventory-control section.

3. *It facilitates the interchange of materials among departments.* Inventory control can act as a clearing house for matching surplus items in one department with the needs of another.

4. *It minimizes, and should prevent, losses connected with incoming materials.* Such losses arise from wrong count, poor quality and damage. Undetected or unreported damage to incoming materials may result in serious loss, whether the damage is the fault of the vendor or the common carrier. Time is often of the essence in damage claims. For example, since central stores was not qualified to inspect a costly piece of technical equipment for one company's laboratory, the apparatus was sent direct to the using department. The laboratory delayed opening the equipment until three months later, when it was required for use. It was clear that the serious damage was caused in transit, but the time interval before inspection freed the public transportation agency from liability.

5. *It reduces losses to stored materials resulting from mishandling and theft.* The simple plan for reducing this type of loss is to establish automatic responsibility, which is accomplished by the stores section of inventory control. Added to fixed responsibility goes training and experience in handling materials, parts and products. The theft of unprotected small items of general use is proverbial. That was the initial reason for setting up supervised tool rooms and parts departments for repair shops. In addition to preventing such losses, proper control of any kind improves employee morale, if for no other reason than that it increases the workers' respect for management's operations.

6. *It shortens the time between receipt of raw materials and completion of the finished product.* The ultimate in shortening this interval occurs in continuous assembly industries, where an effort is made to have materials and components go directly to the assembly line. The automobile industry probably leads in the successful operation of this plan. To the extent that this aspect of material control can be harmonized with production planning, the function of stores is minimized.

7. *It aids cost accounting by allocating material costs to orders, departments and operating accounts.*

8. *It aids management in making cost comparisons among operations and between time periods.*

9. *It provides data for perpetual inventory records which are used in preparing financial statements.*

10. *It minimizes the investment in inventories* by fixing the maximum amount of materials that should be on hand or available.[1] This is particularly true for items in repetitive use. It is also customary for inventory reports to call attention to slow-moving items. When demand ceases altogether, this fact, too, appears on the reports of inventory control, thus reducing company investment.

11. *It reduces the number of varieties of a given material* by suggestions resulting from critical analyses of materials and parts, and their uses. The opportunity for savings through standardization is particularly marked in the area of supplies. Carbon paper, oils, cleaning materials and a host of

---

[1] For the distinction between "on hand" and "available," see p. 373.

other items are frequently bought in unnecessary variety merely to satisfy the personal whims of their users. The standardization of low-cost items is often overlooked by the engineering department, but such items are constantly visible reminders to a competent stores-keeper. Professional personnel and mechanics are particularly prone to demand unnecessary variety in their materials and equipment. Purchasing frequently gets its standardizing tips from alert stores managers.

12. *It eliminates the old-fashioned "inventory week"* once or twice a year. When the company's fiscal year follows the calendar year, at least one inventory-taking time arrives during the Christmas season. For holiday reasons, and because the longer the "taking" drags on, the more boring it becomes, accuracy decreases as the job progresses. If the physical inventory is incorrect, the resulting profit position on the financial statement is false. The perpetual inventory records of central stores eliminate the necessity of rushed physical stock-taking. The regular practice under the improved system is to make a few physical checks daily against the perpetual records. Besides being more accurate, this plan makes unnecessary the physical exhaustion and low morale which accompany the older plan.

13. *It improves general employee morale,* which always goes along with the feeling that management knows what it is doing. Workers get materials and parts as they are needed, and they learn to count on that type of service. It improves their willingness to increase productivity. The fact that all inventory items must be accounted for according to a scientific plan eliminates those occasions when employees may be wondering "who did it."

How materials get into stores

The ordinary purchase of specific materials or parts is based on requisitions from one of three sources. One source is those individuals who are authorized to requisition. This would ordinarily be an executive or someone to whom he has delegated the function. However, it is not customary, under a controlled inventory plan, for operating departments to issue requisitions. In those cases where foremen do make purchase requisitions, they should be authorized by their superiors.

Another common source of requisitions is from the inventory-control section of central stores, at regular intervals and in regular quantities. This plan applies particularly to repetitive items. The control section of stores requests such purchases when its stock of a given item has reached the prescribed minimum, or ordering quantity. The amount requisitioned is that necessary to bring the item back to its designated maximum. With these items, the quantity ordered is the difference between the maximum and the minimum.

The third common source of requisitions is the production-control department, which authorizes purchase of items not ordinarily carried in stores. Such requisitions are based on the production schedules for customer or stock orders.

When purchasing contracts are placed on a production-program basis, orders against the contract, for inclusion in the stores inventory, are often made on a so-called "float" basis. A "float" is the number of days' supply required on the production floor, in stores, or on orders. These time-supply floats are naturally based on the production cycle, but the volume of the float may represent materials needed for two or more cycles, often many more. In fact, such purchases for stores may cover several months, with designated portions to be shipped by the vendor based on the number of production cycles to be covered. Assembling industries producing one or a few products make an effort to have such materials arrive as fast as they can be absorbed into the production processes.

The purchase of items on the commodity market is guided more by predicted price fluctuations than by production needs. The determining criterion may be an expected price rise or scarce supply. These additions to stores are determined either by some member of top management skilled in the market concerned, or by a special committee.

Materials bought on the basis of these several procurement plans go to the receiving department, or the receiving section of central stores, where they are checked against the purchase order for quantity, inspected for quality and condition and sent to stores if satisfactory. If the materials or parts are unsatisfactory, some type of report or ticket is sent to the person or department responsible for adjusting the discrepancy or disposing of the item. The initiation of this kind of action is a distinct function of inventory control. If the item is short in count or contrary to specifications, the purchasing department is likely to take over after the report is received from inventory control. If the item has been damaged in transit, the traffic department should be notified.

Another source of stores inventory comes from materials, parts, components and finished products made in the company plant, and consigned to stores until it is required by production or sales. It is common practice to send such items through the receiving department for inspection because central stores is held responsible for the number and condition of everything accepted by it, even though the transaction takes place entirely within the company.

Besides items manufactured within the plant, central stores also receives left-over or unused items returned by the production departments to which stores originally issued them. Left-over and unused items result from overordering, or from discontinuance of a product line. Here again, central stores checks the quality and quantity of the returned items. If they go into stores, they are presumed to be in first-class condition, unless a special report indicates otherwise.

All of the transactions discussed have forms for recording the facts. Without records, controls are impossible.

How materials get out of stores

One of the primary functions of inventory control is to keep an accurate record of incoming and outgoing materials of all kinds. All issues from stores are based on authorized requisitions. Requisitions for issuance from stores, or for delivery by stores to departments, originate in the following manner.[2]

1. *Where there is no central production-control procedure,* requisitions from stores are made by department heads, or by foremen on authorization of their superiors, for materials to take care of specific jobs.

2. *When there is a central control procedure,* requisitions from stores are made by the production-planning section. These requisitions are made against specific job orders to which they are charged by the stores record section. Under a production-control system, the requisition is sent to the central dispatching office after the materials have been earmarked for the job in question. When the dispatcher receives instructions to go ahead with that customer or job order, he — or the foreman, if there is no dispatcher — sends the requisition to stores so that the materials will be delivered in time for production to proceed.

3. *In continuous-production industries* such as chemicals and cement, regular daily schedules for materials are sent to central stores, which delivers to the using department. These schedules may be made out for a week or a month, or indefinitely until notice of some change is sent to central stores. Another plan provides for decentralized storage at the using departments, which requisition replenishments from stores as needed, or on predetermined schedules.

4. *In mass production of repetitive lots, materials may go direct from the vendors to the assembly lines,* subject to control by the central stores control section. To keep centralized storage space to a minimum, bulky materials are customarily delivered by vendors to assembly lines for one day's production, while small items may be so delivered to cover a week's or a month's supply. It is important to remember that even under such a plan for decentralized storage centers near assembly lines, the records-control section of central stores maintains constant vigilance on material receipts from vendors and issuances to the production or using centers.

5. *In special cases,* covering replacements for damaged or unsuitable materials, or for shortages in the original requests, requisitions may be made by the foreman, department head, or some higher executive, depending on the company's procedure. In any case, the central stores control section makes out a record explaining the reason for the special requisition.

The physical transfer of materials from the storeroom is made by departmental or storeroom move men, by the plant transportation department, by conveyors to some of the large using departments, or by departmental workers who are sent to the storeroom for requisitioned materials.

---

[2] Some of this material on methods for requisitioning from stores is adapted from L. P. Alford and John R. Bangs, *Production Handbook* (New York: The Ronald Press Company, 1948), p. 363.

Inventory Control Forms

One authority lists twenty-eight forms used for inventory control, suggesting however that since different companies call the same form by different names, the long list probably contains duplications. Although no concern has so many forms, many have more than is necessary. Common sense suggests that the forms should be kept to the minimum required to exercise the controls desired. An explanation of some of the more important forms and records will aid in understanding the procedures of inventory control. The purpose of many forms is obvious from their titles.

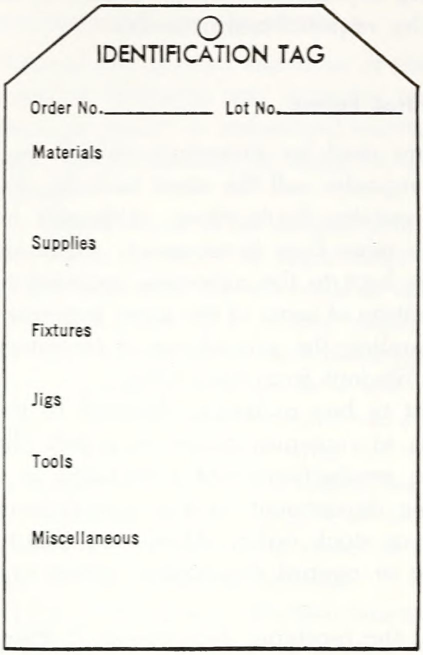
The *purchase requisition* is a request to buy materials, directed to the purchasing department. Its purpose is to replenish stores or satisfy the need of some using department. The *production-order requisition* is a request, also directed to the purchasing department, to buy materials or other items needed to fill a customer or stock order. These requisitions are written by the production-planning or control department where one exists.

The *receiving report* is made out by the receiving department, if there is a department for this activity, or by the receiving section of central stores. It records the details about materials received from vendors, from other departments as surplus from production orders, or as defective items. Materials received from vendors are checked against copies of the purchase orders received from the purchasing department. All needed and useful information is recorded on the receiving report, including the source of delivery, the time, quantity, condition of the materials, and any other data required by accounting or necessary for stores' own control procedures.

The *inspection report* is made out by a section of central stores if the inspection is not technical. When technical assistance is necessary, the findings are attached to the inspection report. As has been mentioned, a summary inspection is made for the receiving report, and this may be all that is needed for most concerns. From a functional standpoint, receiving and inspection normally precede acceptance into storage under any plan of inventory control.

The *identification tag* (Figure 19.1) associates a lot of requisitioned materials with the production order for which it is to be used. Identification tags serve other purposes, but this is the most common one. *Bin tags* (Figure 19.2) are hung on hooks, or placed in containers, where the related materials are stored. They are important running records of the time and amounts of materials going in and out of the storage bins, and the balance on hand. Bin tags are the primary record of merchandise in stores. Frequently, new bin tags are made out for each new lot re-

FIGURE 19.1



IDENTIFICATION TAG

Order No.__________ Lot No.__________

Materials

Supplies

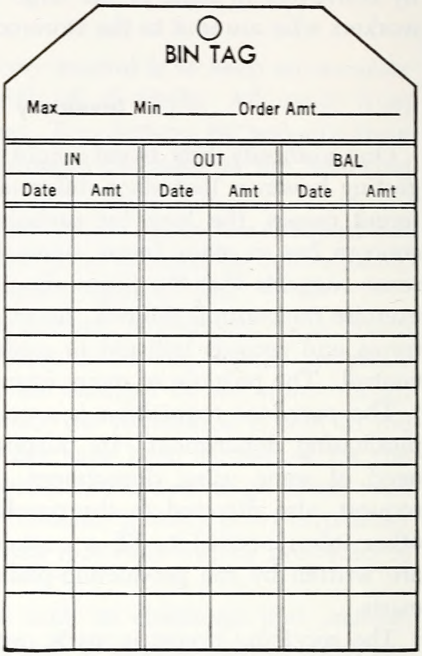
Fixtures

Jigs

Tools

Miscellaneous

FIGURE 19.2



BIN TAG

Max_______ Min_______ Order Amt_______

IN		OUT		BAL	
Date	Amt	Date	Amt	Date	Amt

ceived, so that the old tag can be sent to the control section for checking against the inventory records. Some accountants object to bin tags because they duplicate the inventory record, and because the untrained personnel using them are always likely to make clerical errors.

The *stock record,* or *perpetual inventory,* is the control record for inventories. It is usually kept on separate cards for each classification. The information contained on these stock record cards is obtained from purchasing requisitions, purchase orders, bin tags, inventory adjustment reports, notices of materials received, inspected and accepted or rejected, stores-issue forms, and receipts for materials issued. The stock record gathers together all information needed to control the inventories in stores.

The *balance-of-stores record* is important for the production-control department because its "balance available" shows how much of any stored item is available for production planning. Its original purpose was to maintain a perpetual inventory of materials, supplies, parts and finished products. As control techniques developed, the balance-of-stores record was expanded to supply information to the accounting departments. This expanded record includes:

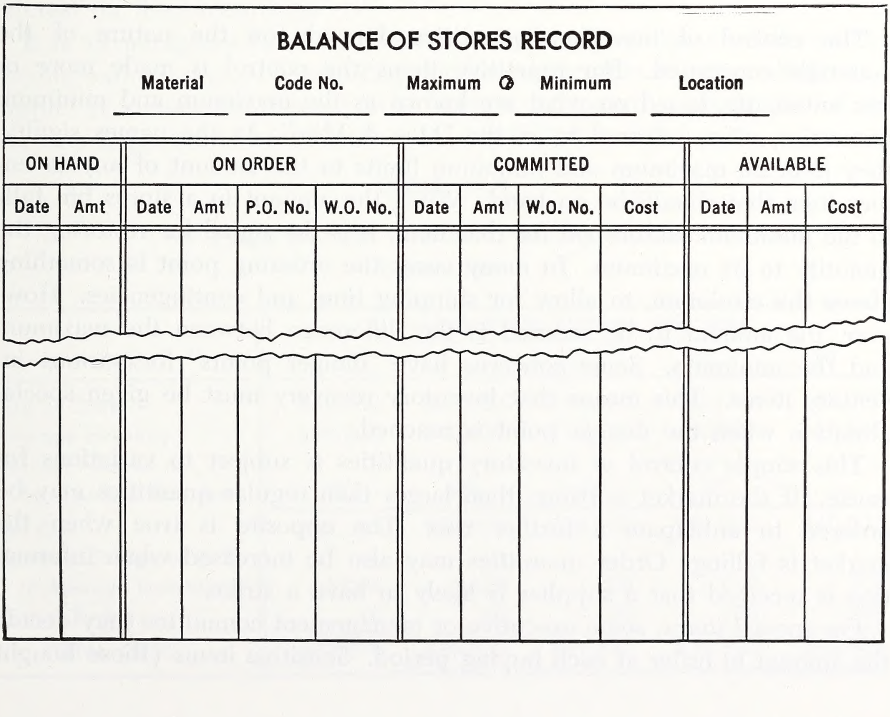
1. Classification of materials concerned
2. Unit prices to be charged on requisitions from stores
3. The value of inventory on hand

4. Periodic requirements based on production cycles for manufacturing concerns, or on sales for other businesses
5. The formula for replenishing stores on repetitive items, including ordering point and ordering quantity
6. A running record of the amount on order, on hand, committed to manufacturing orders or sales, and available for issue

Figure 19.3 shows a balance-of-stores record. From the production standpoint, the amount of materials *available* for requisition is the important item. This amount may be less than the amount *on hand* because of quantities already committed. Outstanding purchases not yet received also affect the amount available and make the amount on hand relatively unimportant. The record, therefore, accounts for "ordered," "on hand," "apportioned" or "committed," and "available."

For each of the four main items on the balance-of-stores record, details such as dates, purchase-order numbers, work-order numbers, quantities and unit costs supply information for control. To expedite storing control, purchase orders based on this inventory form should indicate the location of the materials in stores. This simple precaution makes for faster storing in the proper place and more accurate bin-tag records. To establish the accuracy of this control, the sum of the final quantities "on hand" and "ordered" should equal the sum of the "available" and "apportioned" final entries.

FIGURE 19.3



BALANCE OF STORES RECORD

Material ______ Code No. ______ Maximum ______ Minimum ______ Location ______

ON HAND		ON ORDER				COMMITTED				AVAILABLE		
Date	Amt	Date	Amt	P.O. No.	W.O. No.	Date	Amt	W.O. No.	Cost	Date	Amt	Cost

When the financial data concerning inventories are not carried on the balance-of-stores record, they are kept in an *inventory* or *stores ledger.* Pricing of items in stores is important because material costs are often a large proportion of total costs. When items are issued from stores, their costs are deducted from the total inventory value and are added to production orders, as material costs, by the cost-accounting department. Issues of supplies are also subtracted from inventory values and charged as expense to the using department. Inventory values are also important in making up financial statements showing profits and losses.

The usual plan of pricing materials for charging against orders, and for inventory valuation, is "cost or market, whichever is lower." Some companies use "moving average costs" when the item represents a number of purchases. This average cost of materials on hand must be changed with each new shipment received, which makes the plan objectionable because of the clerical work involved.

Two other plans for inventory pricing are known as "FIFO" and "LIFO." FIFO stands for "first in, first out," and means that materials first received shall be used first and charged at the invoice for each lot. LIFO, or "last in, first out," means that lots received last shall be issued first by stores, and charged accordingly. When market prices are rising, FIFO charges are lower than the market, and they are higher than the market when it is falling. LIFO, on the other hand, tends to keep charges for materials closer to market prices, since it reflects market changes more closely.

Control of Quantities

The control of inventory quantities depends on the nature of the materials concerned. For repetitive items the control is made more or less automatic, based on what are known as the maximum and minimum quantities, often referred to as the "Max & Min." As the names signify, they indicate maximum and minimum limits to the amount of any inventory item that should be on hand. When the amount in a stores bin falls to the minimum established for that item, it is the signal for restoring the quantity to its maximum. In many cases the ordering point is something above the minimum, to allow for shipping time and contingencies. However, the amount to be ordered is the difference between the maximum and the minimum. Some concerns have "danger points" for various inventory items. This means that inventory recovery must be given special attention when the danger point is reached.

This simple control of inventory quantities is subject to variations for cause. If the market is rising, then larger than regular quantities may be ordered to anticipate a further rise. The opposite is true when the market is falling. Order quantities may also be increased when information is received that a supplier is likely to have a strike.

For special items, some executive or management committee may decide the amount to order at each buying period. Sensitive items (those bought on commodity exchanges) represent another classification that cannot be bought by a regular formula such as the Max & Min. In some lines of production, and in other types of business, materials are bought only for customer order.

When to Order. When there is no ordering formula such as that for repetitive items, the time allowed to fill the customer's order and the time required to get delivery from the vendor, plus a reasonable safety factor, are the things that must be considered. If no particular customer order is involved, then market conditions often determine the ordering time.

Determining the quantity to order

The so-called economical order depends on the purchase price, the rate of consumption, the cost of making the purchase, and the inventory carrying charges. The purchase price customarily depends on the amount of the order. Special discounts are usually given for large orders (in addition to the regular "trade discount"), and sometimes this concession is a distinct advantage. The cost of purchasing a large order is frequently the same as for a small one, which may also be a worth-while consideration. The inventory carrying charges must be weighed against the savings just mentioned. It has been estimated that the average annual carrying charges amount to 20 per cent of the original cost. They include such items as the cost of storage facilities, insurance on the materials and the storage space, taxes on the storage space, cost of transportation and handling within the plant from storage to production, depreciation, obsolescence, and interest on the investment.

It is advantageous to make a comparative study of the over-all costs of buying various amounts, including the factors listed in the preceding paragraph. A summarized example of such a comparative study, based on a year's requirement of $60,000 is shown in Table 19.1.

TABLE 19.1

Average Annual Cost of Ordering Various Quantities

ITEM	NUMBER OF ORDERS PER YEAR				
	1	3	5	10	20
Size of Order	$60,000	$20,000	$12,000	$6,000	$3,000
Average Inventory	$30,000	$10,000	$ 6,000	$3,000	$1,500
Discount Allowed on Total Annual Purchase	5%	4%	3%	2%	—
Net Cost	$57,000	$57,600	$58,200	$58,800	$60,000
Carrying Charge at 20% of Average Inventory	6,000	2,000	1,200	600	300
Cost of Buying	10	30	50	100	200
TOTAL COST	$63,010	$59,630	$59,450	$59,500	$60,500

In this example, the annual requirement is $60,000 worth of the materials concerned. The question is how many purchases are most economical. The carrying charges are figured at an over-all cost of 20 per cent of the average inventory in each of the five plans. The cost of making a single purchase is arbitrarily set at ten dollars It is assumed that use of the item is about evenly distributed over the periods considered. It is evident from the tabulation that the most economical buy is obtained by placing five orders of $12,000 each, spaced throughout the year at intervals of about two and one-half months.

Classification and Symbols

Inventory classification, or the listing of commodities in logical groups with respect to their nature or use, should be directly related to company production, or distribution in the case of nonmanufacturing concerns, and to maintaining its accounting records. The established classifications of inventory items determine their location in central stores, as well as their assignment to costing and general accounting records.

Since there is no standard plan for inventory classification, the number of classes depends on the nature of the business and the details of its accounting procedures. Some classifications list as many as forty basic divisions. When the number is small, each general group is customarily broken down into a number of subgroups.[3]

The most comprehensive classification is that of the federal government, which includes ninety-two general groups. In many cases, the classification of stores follows that used by the purchasing department, but the two patterns need not be identical. When they are not the same, that used for stores inventory is more detailed.

Besides aiding in the layout of stores, the classification of commodities expedites stores issues. It also has at least a suggestive influence on the elimination of needless varieties, and so encourages the standardization of materials. It has a direct relation to purchasing when buying is done in terms of the same commodity classifications.

Symbols are used to identify commodity classifications because they save time and reduce errors. Numbers, letters, combinations of numbers and letters, the Dewey Decimal system and mnemonic symbols are the chief methods for abbreviating commodity classifications. The Dewey Decimal system is not generally favored because of the difficulty stores employees have in juggling the decimal points, thus leading to more errors than the other plans.

F. W. Taylor is credited with being the first to apply a system of mnemonic symbols to the classification of inventory items. A mnemonic symbol is usually a letter or group of letters which abbreviates the name of the item symbolized. Thus the single letter "P" might stand for "pipe" and the combination "Pb" stand for "brass pipe." Each company must make up its own set of symbols, reserving the single-letter classifications for the most important inventory items. The combination "Pb" might very well stand for "big potatoes" to the manufacturer of potato chips. Since each symbol is a direct memory cue, mnemonic systems are readily learned and retained by stores clerks and have proved to be a very successful method of inventory classification.

---

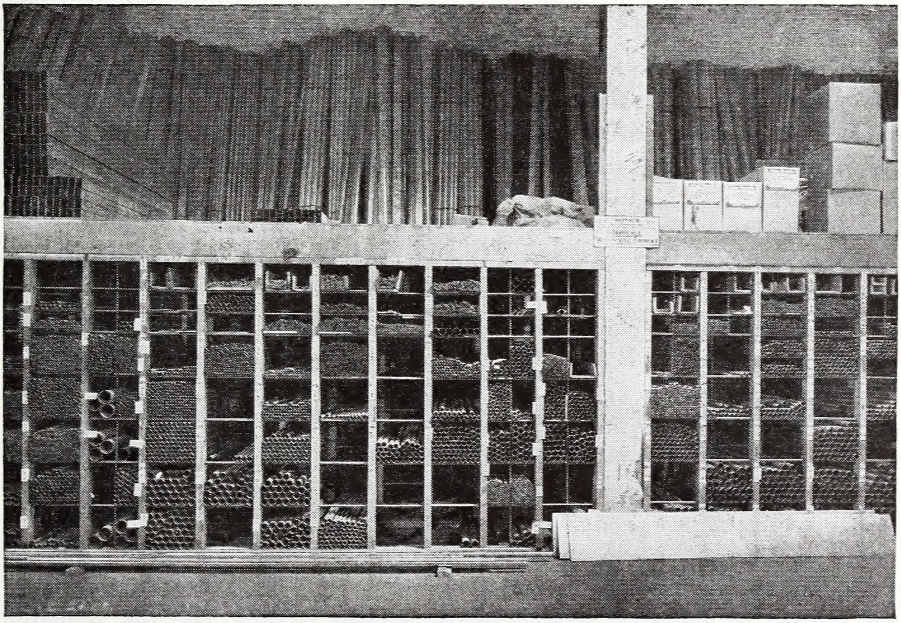
[3] Stuart F. Heinritz, *Purchasing* (2nd ed.; New York: Prentice-Hall, Inc., 1951), pp. 200–201, gives the example of a manufacturer of printing equipment who uses a four-way classification to cover 50,000 items. The basic groups in this case are: (1) factory materials and supplies, (2) raw materials, (3) commercial parts and (4) investment items. These four classes are broken down into 42 subclasses.

Simplification and Standardization

Simplification refers to the elimination of needless varieties in sizes, colors, types and grades of supplies, materials or products. The word is used in production to denote the simplification of methods and processes. In the use considered here, it is presumed that when a product, part or type of supply has been reduced to the smallest number of serviceable or salable varieties, it should be standardized at that number. Simplification precedes standardization, and standardization freezes the item officially at the number of varieties agreed on until some change is made

FIGURE 19.4

Pipe Storage Warehouse



Courtesy: Lawrence Warehouse Company

by management. In other words, the final simplification should be made the working standard.

Lack of reasonable product standardization is proverbially blamed on customer desires. The sales department opposes simplification because it wants to make selling easy by supplying customers anything they ask for. It is often contended by the sales department that simplification will reduce sales. However, since a simplified standard line means lower production costs, customers should be sold on the idea of receiving better merchandise at the same price, or the same products at lower prices. Either lower costs or improved quality should promote customer acceptance.

It has already been pointed out that the greatest opportunities for simplification lie in the area of supplies. Although the cost of any one new variety is probably not important, the total expenditures on supplies may run into large figures, and the greater the number of varieties purchased, the larger the total expenditure will be. Besides running up inventory investment, needless varieties of parts and supplies promote waste. The material-control section should be cognizant of items of low use and remedy the situation by requiring standard item substitutes.

Centralization of Stores-Keeping

The degree of stores centralization depends on the size of the concern and the purposes it wishes to accomplish. Obviously, small concerns should centralize stores operations. The question is not so easily answered with medium-sized and large companies. If a large company has a one-story plant in a single location, it may well consider decentralizing its stores activities.

The question of single or multiple stores has two phases. One concerns the physical layout, and the other the control. If it is decided that decentralization will increase production by bringing stores closer to the production line, then the question of centralized control becomes more important. Certainly there must be central control, but the difficult question is how much.

If the company has more than one plant, there is even more reason for decentralization of stores. The approved plan is a generous degree of decentralized operation, subject to established stores policies and centralized controls.

Another argument in favor of multiple stores — an argument which applies to decentralization in general — is that more individuals are given the opportunity to show initiative in directing the separate stores operations than would be the case under centralization, and this situation always tends to improve both morale and productivity.

The number of storerooms and their location depends on the nature, value and turnover of the commodities involved. The layout of the plant, the volume of materials needed for its various centers, and the available space are also pertinent considerations. Decentralized storage must also take into account items stored temporarily, as well as heavy, light, spoilable and dangerous materials.

The stores layout must ordinarily provide for:

Storage of all kinds of materials
Receipt and inspection of incoming items
Issuance of materials for use or shipping
Aisle space based on the circumstances
Flexibility of physical arrangements

Storeroom physical arrangements should follow the established classification plan, if possible. The other arrangement is based on the amount of use for the various items, or the most convenient use of the fixed physical conditions. Either of these arrangements will require an index to expedite the location of stored commodities.

Conclusions

In many concerns, including manufacturing, inventories may represent half the company's net worth. In wholesale merchandising and department store businesses the percentage is much higher, and in most cases the value of their inventories far exceeds the value of their cash at all times. In spite of these facts, inventory control, while considered important, certainly rates lower than cash control with most concerns.

The situation with respect to inventory control is improving. It was not so many years ago that production stock rooms and tool cribs were left open and unattended so that representatives of using departments could save time by taking care of their own withdrawals. Saving of time under such conditions does not necessarily reduce costs. It was the contrary conclusion that led to the locked tool crib, accessible only to authorized persons. Then the "stockroom" received the same treatment. Later both were put in charge of responsible attendants when the concern was large enough to warrant the expense.

As the supervised stock and tool rooms became more prevalent, plans for inventory control were developed. Management not only wanted company possessions to be safe from theft and damage, but it wanted to know what was on hand and available at all times, not merely at stock-taking time.

The next step was for inventory control to keep records of the cost of all items so that charges to customer orders could be recorded at the level where the parts, materials and supplies went into production. The relationship between inventory control and accounting developed slowly but steadily, so that they are now partners in control and costing.

The value of inventory control has been demonstrated throughout this chapter. It should be emphasized again that management has a very loose control over its business as a whole unless it has a dependable control over its inventory at all times. It should also be re-emphasized that any well-operated plan of management control engenders the respect — and therefore good morale — of all employees, in addition to stimulating proper attitudes toward company property.

QUESTIONS

1. What are the four ranking controls, and what are the five classes of materials subject to inventory control?
2. Discuss some of the important activities of inventory control.
3. What is the relation of inventory classification to the arrangement of inventory in central stores?
4. How can the inventory record of inactive, obsolete and damaged items reduce over-all operating costs?
5. How is inventory accounting related to cost accounting?
6. Explain some of the advantages of inventory control.
7. What are the sources that account for inventory getting into stores?
8. How do materials get out of central stores?
9. What is the relation of the inspection report to the receiving report?
10. How does the identification tag assist the production processes?
11. What is the relation of the bin tag to the physical and perpetual inventories?
12. Explain the items required for an acceptable balance-of-stores record. Why must committed inventory items be subtracted from those on hand to show what is available for production?
13. How do the Max & Min quantities aid in determining ordering quantities for repetitive items of inventory?
14. What circumstances make it advisable to deviate from the ordering quantities indicated on the bin tags?
15. Which type of classification symbol would you recommend for a department store's warehouse, and why?
16. If you installed a decentralized system of stores-keeping for a multiplant or department store operation, how would you plan for control of the system?
17. What relation would you establish between the physical arrangement of a central stores installation and its inventory classification?

CASE PROBLEM

MONARCH DISTRIBUTING COMPANY

The Monarch Distributing Company sells $250,000 worth of couplings annually. Although the normal trade discount given by the supplier on this item is 40 per cent of the list price at which Monarch sells to its customers, the annual investment for this one inventory item would be a considerable sum if the year's supply was bought on one order and stored awaiting customers' orders throughout the year.

However, this lump-sum order of 10,000 couplings would entitle Monarch to an extra quantity discount of 10 per cent. This discount may be an advantage since the sales experience of Monarch shows that its customer orders are received on an even basis during the twelve-month period.

Monarch's purchasing agent is trying to decide whether to buy from its supplier in one lump order, or to spread its requirements on a semiannual, quarterly or monthly basis. He is advised by the vendor that the volume discount for these four different sized orders will be 10 per cent, 6 per cent, 3 per cent and net, respectively. The P. A. figures that it will cost his company 25 per cent of the average gross inventory value for annual carrying charges, and that the clerical cost of placing an order is $10.00.

PROBLEM. On what basis should Monarch buy its coupling requirements from this vendor?

CHAPTER 20

Personnel Management

This book began with the statement that men, materials, machines, money and markets were the principal elements with which modern management is concerned. Of these five elements, men are the most important and the most problematical. This is true despite the rapid development of the machine. Even at the dawn of an age of automation, it is men who are continuing to build the automatic machines and their electronic controls, and who will be responsible for their operation and maintenance.

Personnel management deals with people. Its relation to workers and management, the twin partners of business, has been likened to the zipper, which in this case dovetails the contributions of the partners to produce the desired results. Maintaining machines in orderly production is a simple operation compared to exercising control over workers with all their individual psychological differences and group motivations. We have developed elementary personnel controls to keep workers in line with predetermined standards, but we are by no means sure of our standards. Even if we were, no set of standards could be expected to cover all the multitudinous variations of human behavior. This is the challenge of personnel management.

Foundations of Personnel Management

It has been well said that good personnel management has three outstanding facets: (1) the cooperative and understanding mind of its chief, (2) the competent specialist planning the program and (3) a group of written policies, principles and objectives, backed by management and practiced in daily contacts with all company personnel.[1]

Personnel Relationships. Personnel management must be eternally conscious of the fact that the American worker is a citizen, a member of the organization where he earns his living and often of a union group as well. These relationships require that personnel deal with the worker as a member of at least two different organizations which are seeking his loyalty. Personnel must also represent this worker to management, and management to the worker. Such an assignment requires both scientific skill and human understanding.

---

[1] From an address by Thomas G. Spates, formerly vice-president in charge of the Personnel Division of the American Management Association, given before the Suggestion System Association in Pittsburgh in 1945, and published in pamphlet form by the AMA.

It has been suggested frequently in recent years that adequate personnel managers are "agreement shooters," who are more valuable than trouble shooters because they act before rather than after the trouble occurs. The agreement shooter tries to find out why things are going well, rather than why they are upset. He is looking for the principles that promote human agreement.

Size of the Personnel Problem. The Census Bureau of the Department of Commerce notes that manufacturing industries now employ more than sixteen million people. Trade employs about nine million, agriculture eight million, financial institutions six million and the various layers of government another six million. All of these millions of workers are affected by the personnel policies and practices of their employers. Personnel relations of the large and medium-sized companies are cared for by directors with varying degrees of training and skill, while the worker relations of the smaller organizations are handled by owners or general managers. Whoever is in charge, the accepted principles of personnel management must be adhered to for successful results.

Basic personnel problems

One of the basic personnel problems arises from the fact that the employer has a job to be done at a price which will enable him to sell his product at a profit, while the employee insists that he be paid what he thinks he is worth. If the employer cannot attain his goal, his orders may decline until he goes out of business, or he may have the unlikely alternative of developing new labor-saving devices. If the worker cannot realize what he considers a fair deal, he has the doubtful privilege of finding other employment. It is the job of personnel management to strive for higher productivity per worker in order to maximize not only the employer's profits but also his ability to pay his workers what they are worth.

A second basic problem for personnel arises from the natural psychological diversity of the people with which it must deal. Labor, like management, is made up of people with unique personalities, each with his own characteristic problem, desires and sometimes baffling eccentricities. It is these intangible factors that make it unsafe for the personnel manager to trust guiding principles unduly in situations where there is no real guide except the exigencies of the occasion. He must often enter what promises to be a heated conference with an open mind, free of preconceived opinions or plans, and guided only by developments as they unfold.

The third personnel problem is the too general antagonism to the role played by the department. If the manager tries to exercise line authority, as he sometimes does, he deserves the antipathy which he engenders. But even if, in his personal actions, he gives no grounds for resentment, the *role* of personnel manager itself is often frowned on from its very nature. Personnel should be a staff function set up to serve all departments with worker problems such as recruitment, interviewing, testing, hiring, placement and training, to mention only the fundamentals. Since this staff department is a relative newcomer, it has taken over functions which not too long ago were exercised by other department heads. Even foremen resent the intrusion. Hiring and firing was the double-edged sword which foremen were accustomed to wield in maintaining discipline and productivity. Most department heads wonder how the new personnel institution has learned to find employees more acceptable than those which they formerly hired. Skeptics outside the personnel department wonder how this new activity can be responsible for training programs in fields where its representatives have had neither training nor experience.

Organization

The organization of the personnel department may follow one of the line, functional, line-and-staff or committee forms discussed in Chapter 8. The organizational form employed depends on the size of the company and the functional relationships within it, the importance of its personnel problems and the capacity of its personnel director. More specifically, the structural design of the personnel organization is affected by the following considerations:

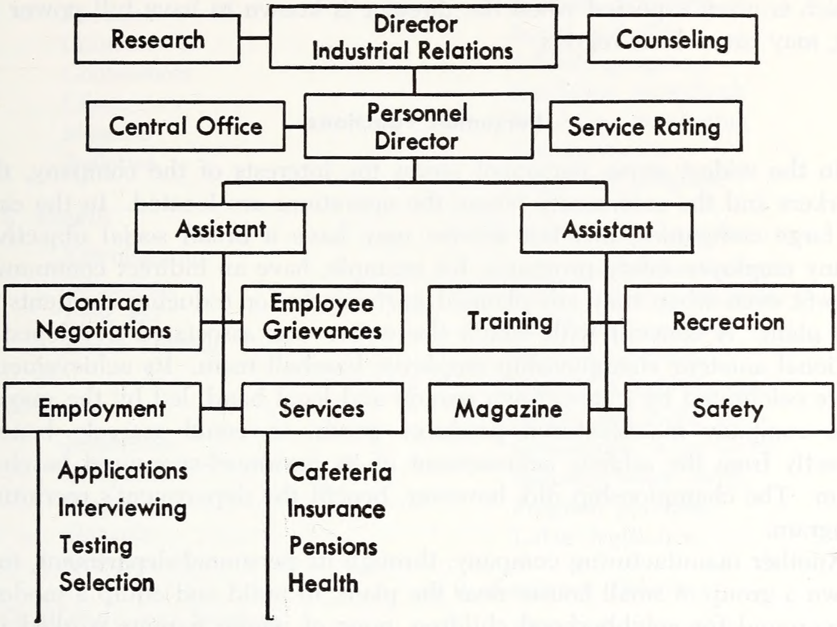
1. Management's opinion of personnel's importance
2. The influence of legislation and organized labor
3. Size of the company and number of its plants
4. The nature of its production and labor problems
5. Training, experience and personality of the director

When the personnel department is a staff function, as it should be, its organization is divided functionally and usually set up on a line basis. In its functional services, personnel ordinarily deals directly with the various departments being served. Figure 20.1 illustrates a functional setup on a line basis. This plan would be suitable for a large company with several thousand employees and important personnel problems.

The question of multiple plants or businesses also affects the organization of the personnel department. Briefly, the department may have direct representatives stationed in the various plants, subject to its control, or each plant may have independent personnel organizations reporting to the plant superintendent. In the latter case, the department at the home office may exercise a general supervision for the purpose of suggesting improve-

FIGURE 20.1

Personnel Organization: Large Company, Single Operation


Research
Director
Industrial Relations
Counseling
Central Office
Personnel
Director
Service Rating
Assistant
Assistant
Contract
Negotiations
Employee
Grievances
Training
Recreation
Employment
Services
Magazine
Safety
Applications
Interviewing
Testing
Selection
Cafeteria
Insurance
Pensions
Health

ments in operations and for controlling policies affecting personnel and labor relations.

Two other considerations affect the organization of personnel. One is the relationship of its activities to the chief of labor relations. Shall personnel report to labor relations, or vice versa? Both plans are found in practice, and the decision seems to depend on the relative importance of the two in individual cases. We also find them combined in a single department, called Personnel & Labor Relations — or sometimes the Labor Relations takes precedence in the title.

The other organizational consideration concerns the importance of personnel and labor relations, considered together, in the total organization. Shall they report to some department such as finance, or be set up as a major function, reporting directly to the top executive? The answer depends on management's opinion of the importance of personnel and labor relations. It is often contended by the trained personnel workers that the department should be headed by a vice-president, on the theory that organized labor and the workers will be more impressed and correspondingly amenable. Those who disagree feel that the department's director is in a better protected position when he can tell organized labor that he must consult his chief (or the company's labor committee) before answering the important question they have just asked. This reply gives him time to consider various answers and their long-range effects, so that he can discuss the problem intelligently with his superior. An immediate answer, on the other hand, which is often expected when the director is known to have full power to act, may cause later regrets.

Personnel Functions

In the widest sense, personnel serves the interests of the company, the workers and the community where the operations are located. In the case of large companies, this last service may have a broad social objective. Many employee safety programs, for example, have an indirect community benefit even when they are planned particularly for reducing accidents in the plant. A concern with which the writer was associated developed a national amateur championship employee baseball team. Its achievements were celebrated by a downtown parade and local band, led by the mayor. The company manufactured producer goods, so could scarcely benefit directly from the athletic achievement of its personnel-sponsored baseball team. The championship did, however, benefit the department's recruiting program.

Another manufacturing company, through its personnel department, tore down a group of small houses near the plant, to build and equip a modern playground for neighborhood children, none of whose parents worked for the concern. The same company's personnel department provided transportation and circus tickets for one hundred small children selected by one of the city's social agencies.

Personnel activities or functions may be variously classified. The breadth of the modern personnel program can be appreciated from an inspection of the following list, which breaks down the work of a personnel department into nine major areas with seventy-six distinct functions.

1. *Employment*
   - Labor sources
   - Recruiting
   - Interviewing
   - References
   - Tests
   - Physicals
   - Selection
   - Placement
   - Induction
   - Counseling
   - Transfers
   - Promotions
   - Exit interviews
   - Records
   - Reports
2. *Working Conditions*
   - Sanitation
   - Ventilation
   - Lighting
   - Heating
   - Rest periods
   - Food service
3. *Wages and Hours*
   - Wage scales
   - Incentives
   - Overtime
   - Bonuses
   - Standards

4. *Training — Education*
    - On-the-job
    - Lectures
    - Courses
    - Conferences
    - Library
    - Manuals
    - Bulletins

5. *Health*
    - Examinations
    - Education
    - First aid
    - Home nursing

6. *Safety*
    - Inspection
    - Education
    - Programs
    - Hazards
    - Compensation

7. *Welfare and Services*
    - Steady employment
    - Unemployment insurance
    - Accident insurance
    - Health insurance
    - Hospital insurance
    - Life insurance
    - Severance pay
    - Retirement pensions
    - Savings and loans
    - Housing programs
    - Social activities
    - Athletic programs
    - Employee periodicals
    - Employee purchasing
    - Transportation
    - Legal aid program

8. *Research and Controls*
    - Job analysis for hiring
    - Labor turnover statistics
    - Accidents — records
    - Absence statistics
    - Worker morale factors
    - Wages and living costs
    - Community wage levels
    - Industry wage levels
    - Program planning
    - Labor legislation

9. *Employee Relations*
    - Grievance procedure
    - Labor access to management
    - Management access to labor
    - Female workers
    - Handicapped workers
    - Minority groups
    - Contract negotiations
    - Policy indoctrination

When these activities are grouped under divisions, in charge of individual chiefs, the following separations are customary:

Employment Division (Groups 1-3 inclusive)
Research Division
Training Division
Health and Safety Division (Groups 5 and 6)
Welfare and Services Division
Employee Relations Division

Principles and Policies

Principles are basic to the formulation of policies. In the present context, principles are statements of modes of behavior which have proved in action to be fundamental guides in establishing harmony among workers and executives and between the two groups. The best personnel principles are only special cases of the more general principles of group dynamics.

The following are singled out as the most important:

1. *Establish reasonable hours, wages and working conditions.* The meaning of "reasonable" is relative, but it can always be defined by the practice of the best-managed concerns. The trend is ever toward shorter hours, higher wages and better working conditions. The current acceptable levels for all three are not difficult to discover.

2. *Treat employees as worth-while individuals.* The importance of recognizing workers as individuals is discussed in numerous volumes, technical journals and speeches. It is the antithesis of the older concept of viewing the worker as a commodity. He is a citizen, with the same psychological complexity as the executive. And it must not be forgotten that management often fills its ranks from the worker group.

3. *Let the worker "in on the know."* Workers should be given news of general company interest before it becomes public knowledge. Good communication of company and employee affairs all down the line minimizes suspicions and gossip based on ignorance of the facts. It builds confidence and creates the feeling of belonging. In one company, for example, the unloading of two freight cars full of automatic machines started a rumor that the work force was to be reduced. After the gossip had reduced productivity and increased absences while employees were looking for other jobs, the president called a mass meeting to explain that the new machines were to take care of a large order calling for deliveries over a two-year period and that additional help would soon be needed. The plant quickly got back to normal, but with a good communication program the rumors and resulting drop in productivity would never have started in the first place.

4. *Substitute mutual dealing for paternalism.* Mutuality of employer and employee interests should lead to worker participation in decisions which affect those interests. It makes the worker feel that with respect to such company plans he is considered an equal. A large concern provided one of the most attractive parks in the country and dedicated it to the enjoyment of its employees and their families. When a stranger asked the name of the park, an employee replied, "We call it Bonus Park because we paid for it out of our pay envelopes." Probably this unappreciative name would not have been applied to the park if a representative committee of the employees had participated in its planning. The spirit that prompted the company's action proved its motive — to furnish a collective recreational opportunity for its many families. But it evidently did not occur to the management that their idea would become more vitally interesting and acceptable if those for whom the park was planned had had a part in that planning on a truly mutual basis.

5. *Install new programs only after consultation with the workers.* Organized workers do not relish being surprised, not even with wage increases. In keeping with the spirit of trade unionism, workers want to bargain for such things. Wise management "gives" a thing to the workers only after they have developed and expressed a desire for it.

6. *Give new programs time to work.* New ideas and procedures require time to make roots. Even when a new program is installed with the consent of the workers, it must meet the natural opposition of the established mode. Resistance to change is ingrained in human nature. It is reasonable, therefore, to wait patiently for new ideas to become agreeable rather than merely acceptable.

7. *Practice established principles whole-heartedly.* If the workers have reason to feel that personnel is giving only lip service to its stated principles, they will come to resent and even oppose both the idea of the personnel program in general and the way in which the program is carried out in practice.

Policies based on these principles should be written in clear and simple language and communicated to all those who are affected. The working force must not only be aware that such written policies exist; the personnel department must see to it that the workers are thoroughly familiar with their content. Policies are often set forth in an employee handbook, entitled "Rules and Regulations." An illustration of the subjects contained in such a handbook is provided by the employees' manual of Sears Roebuck & Company, *Let's Get Acquainted,* which is divided into company policies and company rules. The following items are found in its index:

Absences
Accidents
Appearance
Awards
Borrowing
Bulletin boards
Car insurance
Catalogue selling
Contingents
Correspondence
Courtesy
Credit
Deaths
Delivery service
Employee accounts
Employee benefits
Employee classes
Employee discounts
Group Insurance
Health
Hospitalization
Illness
Jury duty
Lending
Lost and found
Meal periods
Moving
Pay increases
Period calendar
Personal belongings
Profit sharing
Promises
Promotions
Rest periods
Safety
Selling ratio
Service awards
Shoplifting
Split shifts
Stockholders
Store care
Store directory
Suggestions
Telephoning
Training
Transfers
Vacations
Wages
Working Hours
Wrappings

This list gives a rather complete word picture of what one may expect to find in an employee handbook.

The Director

When companies are small it is natural that the owner or chief should handle the personnel job. Prior to the present century the personnel function was largely restricted to hiring and firing, plus whatever paternalism management cared to practice. During World War I, openings for personnel directors multiplied all over the country, especially with firms interested in war work. At that time competent directors, as we recognize them today, were in short supply. Their chief job was to draw workers from other companies and devise plans to minimize their further migration.

During this early period, personnel directors were recruited largely from clerks of questionable competence, newspaper reporters who had not yet reached the upper pay group, ex-detectives and lame-duck politicians. Trained men were not hired for the simple reason that there were none. Another decade passed before colleges set up courses or curricula in the personnel field.

With the sharp recession following the First World War, personnel departments were dropped like frills in a panic (and, at that time, most managements considered them no more than decorations). It was felt unnecessary to employ a personnel director to dismiss employees for whom there was no work. The demand for personnel services rose again as the boom of the twenties progressed, only to fall off sharply once more during the long depression of the thirties.

Meanwhile, colleges were instituting courses in the various phases of personnel work so that a trained but relatively inexperienced supply was ready to serve business and industry during the war boom of the forties. With management's better understanding of the expanded personnel functions, and the increased training and experience of the new professional group, the standards of service have steadily risen. From the early days when a friendly smile and a flair for back-slapping qualified a man to be personnel director, we have reached a point where the successful candidate must generally add formal training in the principles of personnel management to a natural capacity for getting along with others.

Personnel management has matured as a respected contributor to the profits of business. What are some of the qualifications of a modern director?

1. *Ability to get along with others* is generally recognized as the prime requisite. If the director hopes to resolve social and psychological conflicts within the worker and management groups, and between them, obviously he must first be able to secure acceptance for himself.

2. *Impartial service* must be the motivating force for success. The director must not only have such motivation, but he must convince the workers of it by concrete examples.

3. *Ability to use the scientific method* in reaching decisions is a tool for which the director has constant use. Decisions must be made promptly and without personal prejudice. In this field, promptness of decisions is crucial.

4. *Ability to listen* is important. Often the director will have heard the story of a complaint before the aggrieved worker recites it to him, and he may know, further, that the worker's version is not based on the facts. Nevertheless, he learns to listen attentively, even to repetitions, because he knows the therapeutic value to the worker of getting the whole story off his chest.

5. *Appreciation of the pride and efforts of others* is one of the main characteristics by which he gains the acceptance of the workers. The successful director adopts an attitude which assures others that he appreciates all sides of a controversial or personal problem.

6. *Formal training in personnel techniques and methods* is, of course, a necessary background.

Employment Activities

In an earlier section we listed seventy-six distinct functions of a personnel department, grouped under nine general headings. The remainder of the present chapter will be devoted to an elaboration of the activities listed in the first group, those dealing with employment. The other groups of activities will be treated in subsequent chapters. It should be pointed out again that organization of the general personnel functions varies from company to company and that all seventy-six of these activities are not necessarily found under the jurisdiction of personnel. And yet almost all of them are problems that have to be attended to in one way or another, even in the smaller organizations, where no personnel department, as such, exists.

The labor budget

To do a good recruiting job, personnel must know well in advance how many employees will be needed in the various job classifications. When this information is scheduled, it is known as the labor budget. Most hiring is done on day-to-day requisitions from the using departments. This lack of system is popular because it requires little thought or planning. However, it can result in interruptions in production, poor worker selection and loss of supervisory and executive time in pressing the personnel department for action.

Development of the labor budget received new attention during World War II when the federal government was exercising close manpower controls. Those companies which knew their labor requirements in advance received the cream of the crop. As the war progressed, manpower budgets were made mandatory for planning labor distribution and making draft quotas.

The first step in a labor budget comes from estimated sales, upon which production depends. Then the total production schedule is broken down into departments, with the numbers and classes of help required for each. The relation of these figures to current employment indicates preliminary estimates of the number and types of workers who must be hired or dropped. These preliminary figures must include the estimated separations which will result from a number of causes. The final figures show the number in the various classifications who must be added or dropped from the payroll during the budgetary period.

Job specifications

Lists of requirements for each job, or "job specifications," are necessary for matching candidates with job openings. In practice, the employment office must have both job and man specifications to perform its function satisfactorily. The man specifications list the personal qualifications required for the job, such as age, sex, weight, education, training and experience.

Job specifications are obtained from job descriptions, which are compiled

FIGURE 20.2

Analysis of Job Requirements

Job Title______________________ Department______________

Sex__________Age Range__________Height__________Weight__________

Strength Required______________________ Visual______________

I. OCCUPATIONAL DETAILS

II. EXAMPLE OF TYPICAL WORK

III. TRAINING REQUIRED
1. What actual schooling is needed?
2. What training is necessary?
3. What experience is necessary for acceptable proficiency?

IV. SKILLS REQUIRED
1. What manual skills are required?
2. What mental skills are required?

V. MENTAL EFFORT REQUIRED
1. Degree of sustained mental effort?
2. Degree of initiative?

VI. PHYSICAL EFFORT REQUIRED
1. Sitting bench or desk work?
2. Light standing work?
3. Operating light machines?
4. Working with hand tools?
5. Handling materials?
6. Using heavy hand tools?
7. Moving heavy materials?
8. Heavy and sustained physical work?

VII. RESPONSIBILITY REQUIRED
1. For the safety of others?
2. For spoiled parts and materials?
3. For machines and equipment?

VIII. WORKING CONDITIONS
1. Surroundings?
2. Hazards?
3. Connected expense?

FIGURE 20.3

Job Description

Job Title. Typist I

Location. Bureau of Business Research

Mechanical Skills. *20% of time*

5% Cuts stencils for addressograph, types labels for leaflets, letters and manuscripts for publication. Types up form used in a statistical report.

15% Operates calculator to compile and transpose figures. Uses adding machine and addressograph. Instructs temporary statistical employees in the use of the calculating machine.

Correspondence, Mail, File. *5% of time*

5% Keeps file of addressograph plates and research publications. Card file of 2600 names on addressograph plates. Keeps file on all publications received from federal and state agencies, and economic and business concerns. Has contact with all departments seeking information on business subjects.

Clerical. *75% of time*

75% Receives penciled rough draft layout of a table or series of tables, and sets up columnar sheets on which the units are classified by attributes. The classifications are frequently suggested by the incumbent. For example, from two arrays of statistics, she will take significant attributes from each, and subject them to testing to determine the most satisfactory grouping and size classification of these attributes for the purpose of combining and cross-classifying them in a new table. Also makes suggestions for the outline of summary or derivative tables by proposing the addition or deletion of items, or the choice of preferred items among several possibilities. Each of these procedures involves a considerably greater degree of judgment and comprehension of material dealt with than is required in compiling and computing. Following approval of the table outline in final form, she computes per capitas, per worker values, percentage distributions of total amounts, percentage relationships among categories, medians and other averages of a series of groups, ranges in a series of groups, percentage changes among years, and percentage changes and differences among areas.

Meetings. *0% of the time*

0% No specific duties.

from job analyses. These are the three logical steps, in reverse order, for determining the job requirements and the type of persons capable of meeting them. The analysis is a complete breakdown; the description summarizes the analysis; and the specifications are detailed requirements drawn from the job description. From the job specifications it is possible to determine the type of person required for the job. Figures 20.2 and 20.3 illustrate job-analysis and job-description forms.

Recruitment

When personnel receives a requisition for additional help or replacements from one of the using departments, applications on file or new recruits must be used to fill the order. Among the various *sources* for recruiting new employees are newspaper advertisements, trade journals, employment agencies, colleges, present and former employees, and "the gate." This last source is a hold-over term from the days when plant foremen did their own hiring at the plant gate (or in a neighboring saloon).

The choice of source depends entirely on the type of recruit sought. On certain jobs, selection starts with recruitment. This is true of company scouts sent to colleges to interview students. Many private employment agencies in large cities are also performing both recruitment and selection services for their clients, some of whom are served entirely by a single agency for all technical employees.

Good employees already on the payroll are often the best source — both in numbers and in the quality of their work — for many kinds of recruitment. Furthermore, employees can be of great help in suggesting new recruits. A letter addressed to the employee's home, stating that the company needs certain kinds of help and emphasizing that preferential treatment will be given to applicants suggested by employees, usually brings excellent results, in addition to making the recommending employees feel that management respects their opinions.

Interviewing

Most personnel interviews are of three kinds: hiring, general or periodic, and exit.

After recruiting applicants for jobs, personnel must decide which candidates are acceptable, if any. If only one person has been requested for a specific job, it is natural to employ the best of the acceptable group of candidates, and this makes the selection still more difficult. These selection tasks often require skilled judgment in a process which starts with the preliminary *hiring interview,* to determine whether it is worth while to give the candidate further consideration. The second and more extended hiring interview comes after the recruit has passed the required tests and been given a satisfactory record by his reference. The outcome of this interview usually determines whether the candidate is hired.

The *general interview* may have any one of a dozen purposes. One reason is for a general discussion with the employee after he has been on the job a relatively short time, to determine how he feels about the work and his boss. Others of these periodic interviews may be for the purpose of resolving some worker conflict, or discussing a contemplated promotion or transfer. There is no set time for such interviews, which are held as circumstances suggest the need.

If they are approached properly, *exit interviews* can be made very helpful for remedying shop conditions that frequently lead to grievances or "quits" by desirable workers. Many companies keep records of information obtained from exit interviews with employees who are leaving voluntarily, but are not always successful in using the information advantageously. The chief difficulty in getting correct information stems from the fact that the departing employee wants to get on his way with the minimum of lost time, so, to save discussion, explains that he has "a better opportunity." There is not any set plan for learning the truth from the exit interview but it has been found helpful to start the discussion on a personal basis rather than from the company's interest.

One of the difficult problems of the personnel interview is the interviewer. There are so many ways to approach the person being interviewed, and so many more types of interviewees, that to match the approach to the particular person requires quick thinking and a diplomatic manner. Two recognized approaches are the planned and the unplanned interviews. The first has the plans all ready and the questions prepared in advance, while the second is premised on the assumption that the interviewer should have free rein to plan as the interview progresses. With two quite different interview approaches, added to the numerous personalities of interviewers and those of their still more numerous "customers," it is surprising that the results are ever as good as the record shows. It is a task that requires natural aptitude, training and considerable experience.

It is obvious that the physical situation and its surroundings must be conducive to effecting the purpose of the interview. For this reason, undisturbed privacy is the prime requisite.

Testing

Testing is probably the most controversial of personnel techniques. Opinions range from absolute reliance on test results to the conviction that many of them are merely whimsical inventions of the psychologists. The truth lies somewhere between these extremes.

The goal of testing is to find out quickly and economically whether an applicant will be successful on a job. The test score is a prediction of success or failure, never a guarantee. Of the hundreds of tests available to personnel workers, the accuracy of prediction ranges from very high to very low.

There are two important measures of the accuracy of any test. The first of these is known as *validity*. The validity of a test is a measure of the degree to which it accomplishes the purpose for which it was constructed. This can best be measured by comparing the test scores of new employees with their subsequent performance on the job. Another way of "validating" a test is to administer it to a group of time-tried workers of known levels of ability and performance. This criterion group of workers can be divided into three subgroups — superior, average and poor. If the test in question is valid, there should be a reasonably high correlation between test scores and the established records of the three subgroups.

Independent of the validity of a test is its *reliability*, a measure of internal consistency. A common method of gauging reliability is to find out whether a test yields consistent scores when given to the same person at different times.[2] A test may have almost perfect reliability and yet be nearly totally invalid.

The many tests in current use by personnel workers have been classified in a number of different ways. A convenient distinction can be made among those measuring proficiency, potentiality and personality characteristics.[3] *Proficiency* tests measure what the applicant can actually do at the time of testing. In this category fall the very dependable "trade tests." Here the applicant for a job of brick-laying, for example, is given the necessary materials and tools and told to build a wall. Similarly, stenographers and typists are given a certain amount of dictation and typing, and to qualify for the job they must meet established norms for speed and accuracy. When the nature of the job to be filled is not specific enough to make a trade test feasible, proficiency can be measured — with varying degrees of accuracy — by questionnaires which test the applicant's knowledge of the field.

Often a candidate is not expected to have had any experience in the kind of job he is seeking. Here it is not the candidate's acquired knowledge which is in question, but rather his ability to learn. Therefore, tests of ability or *potentiality* are also needed by personnel. The best known among this group are the several IQ tests, but many other tests have been devised to assess a person's ability in such specific areas as manual dexterity, speed of reaction to various sensory stimuli and so on. Personnel will often want to test an applicant for both proficiency and potentiality in order to find out whether he is likely to advance beyond the position for which he is being hired.

A third group of tests is meant to measure various *personality* characteristics which are thought to be relevant to an applicant's success on the job. Such tests are relatively new. Because psychologists have often beaten the drum too loudly for these tests, many a busy personnel officer has turned a deafened ear to personality testing in general. At the same time, personnel officers are well aware that not all of a group of candidates who receive the same scores on tests of proficiency and ability will be equally successful on the job, and that the differentiating factor will lie within the personalities of the new workers. Hence there is a need for good instruments to predict psychological adjustment on the job.

Such instruments are gradually being developed. They have already proved their worth in predicting performance on those jobs where human-relations skills are essential. For example, several investigators, working independently of one another, have found that tests measuring interests and such personality traits as social aggressiveness, emotional stability and extraversion are better predictors of success in the job of salesman than tests designed to measure various mental abilities.[4]

---

[2] Allowances must be made for new knowledge or attitudes which the testee may have acquired during the interval between tests, as well as for the "practice effect" of having taken the test before.

[3] See Edwin E. Ghiselli and Clarence W. Brown, *Personnel and Industrial Psychology* (New York: McGraw-Hill Book Company, Inc., 1948), Chapter 6. This book provides a good technical introduction to testing.

A weakness of many of the most widely used personality inventories is that, while they tend to have high coefficients of reliability, almost nothing is known about their validity. Tests of a respondent's personal *interests* are probably superior to personality questionnaires in this respect. The prototype of this kind of test, the Strong Vocational Interest Blank, was originally designed for use in guidance counseling, but has also proved useful for placement. The test measures the interests of large samples of people who are known to be successful in particular occupations. The presumption is that a person is more likely to make good in a job if his test result shows that he has the same pattern of interests as the successful people in that particular occupation. Validating studies of this test are constantly being made, and the interest pattern of more and more specific occupations are being discovered.

Another weakness of personality tests — thus far, at least — is that so many of them have been developed for use in the classroom and the mental clinic and have only limited usefulness in business. The armed forces may use projective tests designed to bring out unconscious patterns of behavior in order to screen out in advance certain undesirable types of psychoneurotics. But only in exceptional cases would such tests be worth the time and money of most personnel departments. Personnel is interested in selecting potentially successful employees, not in psychoanalyzing its applicants.

In the final analysis, personality tests, like all other tests, are worth while if they can predict success or failure on the job more accurately — and more economically — than would be the case if such tests were not used. In their present state of development, tests can be used only as an aid in selection and placement; they are rarely in themselves decisive. But as an auxiliary instrument they are becoming increasingly valuable to personnel, as ever more accurate tests are being devised.

References

The value of soliciting the opinions of "references" about an applicant for a job is a controversial matter. Communication with the reference is generally by mail, and the reference's letter is more likely to be a collection of rambling generalities than a dispassionate appraisal of the applicant's relevant strengths and weaknesses. One way to avoid such discursiveness is to send the reference a list of specific questions with a check-list of answers to restrict the possible replies.

Several observations can be drawn from experience about the dependability of references:

---

[4] *Ibid.*, pp. 198–201; and O. F. Habegger, Jr., "A Case History in Selecting Salesmen," *Experience with Psychological Tests* (New York: National Industrial Conference Board, Studies in Personnel Policy No. 92, 1948), pp. 15–17.

1. The applicant tends to name as references those who will "puff" his abilities, and this decreases the value of the replies.
2. Occasionally the applicant does not select his references wisely. In such cases, the appraisals are next to worthless because the reference seizes the opportunity to get even with the applicant for some past grievance.
3. There is always the possibility that the applicant's work has improved or deteriorated since the reference's opinion was formed.

The author hired a number of workers on the recommendations of parole officers, and these workers proved to be satisfactory. In this case, the parole officer reported in person and gave facts which amounted to the candidate's life history to date. The recommendation was based on circumstances which developed from the convict's conduct under the naturally trying conditions of imprisonment. The close relation between the candidate and his reference was cemented by the latter's authority to return the client to his former residence for any infraction of company rules — an unusual opportunity for the reference to stand by his recommendation. Such references have proved to be reliable and cooperative. A foundry owner reported that fifty paroled convicts, housed in a dormitory on the plant site, were his most reliable workers.

Some of the best sources of information about an applicant are the personnel departments of other companies where the applicant has been employed. In industrial cities, the exchange of such information, which can be facilitated by local personnel officers' associations, is valuable in eliminating psychological misfits.

Selection

The selection decision depends largely on the application blank, graded tests and the interviewer's report. The chief of the using department customarily makes his selection on the basis of personnel's recommendations. Test ratings lean heavily on battery scores to establish the applicant's capability and adaptability for a specific job. They also rate applicants on physical and psychological factors. In addition, training and experience are weighty considerations in many appraisals.

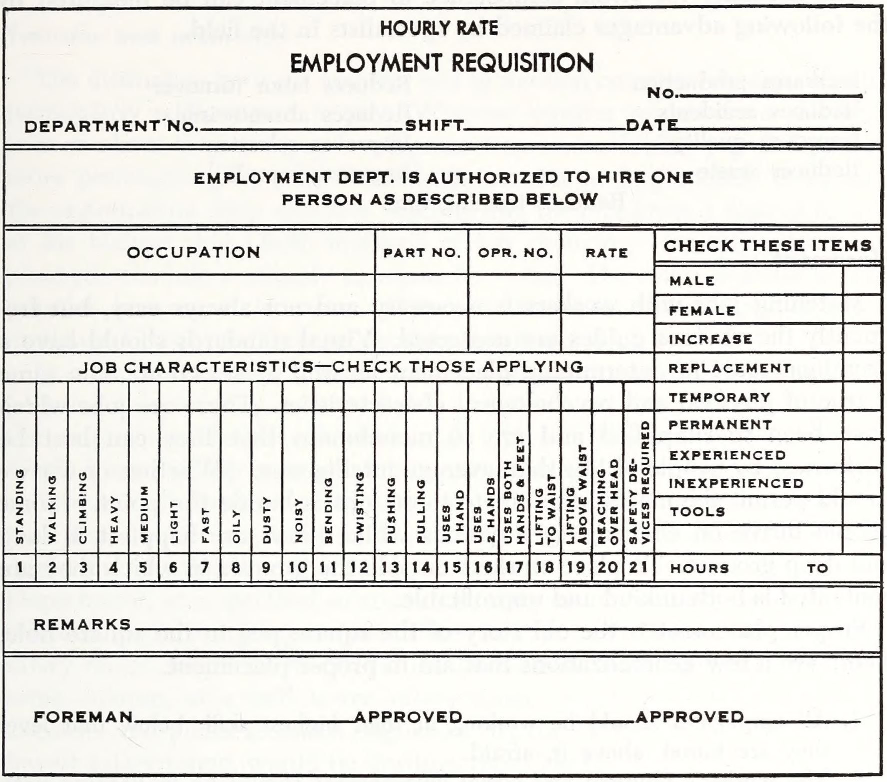
The first decision in the selective process is whether the applicant should be employed. Equally important, and perhaps more difficult, is the question of his placement. The matching of jobs and persons is a technical procedure.

The *psychological* factor may be evaluated by appropriate tests. For executive positions, personnel will naturally want to assess the candidate's personality through interviewing. A few concerns, not satisfied with such an assessment alone, consider applicants' wives when hiring for managerial positions. The president of the American Brake Shoe Company insists that "business doesn't hire men, it hires families."

The specification of *physical* job requirements is important in fitting the applicant to the nature of the work. The job requisition should indicate any characteristics helpful in making the selection. Figure 20.4 illustrates an

FIGURE 20.4

Employment Requisition



HOURLY RATE

EMPLOYMENT REQUISITION

NO.__________

DEPARTMENT NO.__________ SHIFT__________ DATE__________

EMPLOYMENT DEPT. IS AUTHORIZED TO HIRE ONE PERSON AS DESCRIBED BELOW

OCCUPATION	PART NO.	OPR. NO.	RATE

JOB CHARACTERISTICS—CHECK THOSE APPLYING

STANDING	WALKING	CLIMBING	HEAVY	MEDIUM	LIGHT	FAST	OILY	DUSTY	NOISY	BENDING	TWISTING	PUSHING	PULLING	USES 1 HAND	USES 2 HANDS	USES BOTH HANDS & FEET	LIFTING TO WAIST	LIFTING ABOVE WAIST	REACHING OVER HEAD	SAFETY DEVICES REQUIRED
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

CHECK THESE ITEMS	
MALE	
FEMALE	
INCREASE	
REPLACEMENT	
TEMPORARY	
PERMANENT	
EXPERIENCED	
INEXPERIENCED	
TOOLS	

HOURS ______ TO ______

REMARKS ____________________

FOREMAN__________ APPROVED__________ APPROVED__________

employment requisition with job characteristics and corresponding checks through the physical examination. The foreman fills out the requisition, and the plant physician decides whether the applicant's physical qualifications match the employment requirements.

Testing for *visual* qualifications is an important part of the physical examination. Several companies specialize in occupational visual service.[5] Upon visual skills may depend the quality and quantity of the worker's production, his accident record, his opportunities for promotion, his general morale, and occasionally his ability to get or retain a job. Personnel sometimes sets up visual standards required for the various departments. Standards are important in selection, but more so in placement. They can be used for fitting applicants who would normally be rejected into work commensurate with their visual ability. Bausch & Lomb has produced the *Ortho-Rater* (see Figure 23.1, Chapter 23) which tests twelve visual functions related to most operations and affecting the efficiency, safety and morale of employees.

---

[5] Bausch & Lomb Optical Company and Keystone Occupational Visual Service are examples. Literature from these concerns covers thoroughly the subject of visual service for industry.

The necessity for visual competence in placement can be measured by the following advantages claimed by specialists in the field.

Increases production
Reduces accidents
Improves quality
Reduces waste
Reduces labor turnover
Reduces absenteeism
Improves selection
Improves morale
Reduces training time

Placement

Matching jobs with workers is necessary and not always easy, but frequently the obvious guides are neglected. Visual standards should have a prominent part in determining placement as well as selection. The same is true of physical and psychological characteristics. There are jobs which have been so simplified and are so monotonous that they can best be performed by people of less than average intelligence. (Whether or not we should permit the machine to create these jobs is beside the point.) Some people thrive on challenging situations while others are happiest in long and deep grooves. To place workers outside the grooves in which they are contented is both unkind and unprofitable.

Proper placement is the old story of the square peg in the square hole. There are a few generalizations that aid in proper placement.

1. All employees should be working at their highest skill; below that level they are bored, above it, afraid.
2. The worker's physical and social environment should be in keeping with his duties and capacities.
3. The worker must know what is expected of him, be able to do it, and be allowed to do it.
4. The employee should like the job assigned to him, including its duties and methods of supervision.

Training

Training is dealt with in detail in Chapter 28. It is only necessary to point out here that the personnel department is ordinarily responsible for developing programs for workers, foremen and executives. Large concerns often have a training section within the department. Actual training may be conducted by supervisors or assigned under proper control to departments, educational agencies, or members of the executive group. Whatever the training program, personnel should maintain individual achievement records and appraise them for purposes of transfer and promotion.

Indoctrination with company policies is an essential part of training. Indoctrination is derived from the Latin word meaning to teach. The knowledge resulting from a good policy-teaching program minimizes suspicions born of ignorance. It contributes positively by instilling a feeling of confidence, a sense of belonging — in short, good morale.

Transfer and promotion

The distinction between transfer and promotion concerns change of status, particularly with respect to pay. Whereas transfer represents a change of jobs on about the same pay level, promotion means higher pay and perhaps more privileges. The purpose of both transfer and promotion is to make the organization more effective while giving the employee a chance to work at his highest skill. Both methods of job changing may take place on a planned schedule or simply as vacancies occur. The latter practice is more popular because it is easier. However, transfers and promotion on an unplanned basis are likely to produce relatively poor results.

In companies where transfer and promotion are carefully planned, the personnel department will probably provide a master chart, available to the employees affected, classifying all jobs in the plant. Such a chart is divided into vertical columns representing the major divisions of the organization and all constituent departments. Within each column the jobs for that department are listed in descending order of importance. Thus, we might find in the top row of the column for the Electrical Engineering Department, at a specified salary range, the jobs of drafting supervisor and research engineering supervisor. Three or four rows below this, at a lower salary range, might be found the job of chemist. Still further down in the same column, at a still lower salary range, would be draftsmen, junior chemists and junior research engineers. At the bottom of the list, with the lowest salary range, would be drafting room clerks.

Furthermore, these master charts are arranged in such a way that, reading across the rows at given salary ranges, one can tell at a glance what jobs are roughly equivalent, salarywise, in the many different departments. For example, the laboratory assistant in the Electrical Engineering column, the routing clerk in the Industrial Engineering column, or the order clerk in the Customer Service Department may all fall within the same salary range.

Together with such a master chart of job classifications, personnel would keep service ratings on its employees, to aid in matching men with job openings. Not only does the chart guide the personnel department in planned promotions and transfers, but at the same time it enables the employee to see the line of possible promotion within his own department or his opportunities for transfer, at comparable pay, to other departments.

Since transfers or promotions may require advance training preparation, which is shown on the proper job specifications, it is important to prepare estimates of future opportunities likely to be available. Finally, proper posting of vacancies is obviously necessary in any transfer and promotion plan.

Records for controls

All types of control require records, and so it may be concluded that most subjects for record-keeping are proper subjects for control. For personnel controls, the following records are pertinent:

1. Job evaluations
2. Manpower inventory
3. Recruiting records
4. Personnel requisitions
5. Interview records
6. Medical data
7. Induction records
8. Merit ratings
9. Training records
10. Employee discipline
11. Absentee records
12. Grievance records
13. Accident records
14. Labor turnover

Most of these records have been discussed, and in many cases their application to controls is obvious. The objective standards for first-class controls are not always so obvious. The program of initial interviewing of applicants can be evaluated and, to a great extent, standardized by comparing interview records with the employee's subsequent record of performance. A similar approach is used to establish standards for merit ratings. Excessive absences suggest control by attacking the causes. Grievance records may point the finger to particular foremen whose departments have more than a reasonable number of worker complaints. Accident records suggest machine-guard improvements, as well as worker-safety education and transfer or dismissal of accident-prone employees. Analysis of recruiting records indicates the best sources of supply. Medical data reveal the relation between physical defects and unsafe operators. Other working controls can be similarly used by personnel management as the basis of recommendations for improving the quality and quantity of operations.

Personnel forms

The number of personnel forms in any organization will depend on the number of functions that the department is called upon to perform. It is easy for personnel to accumulate a multiplicity of overlapping and hence unnecessary forms. Serious thought must be given to reducing their variety. Those finally selected for use must be carefully drawn up in order to minimize the possibilities of employee misunderstandings. Some excellent forms are available for specific purposes, such as separations, transfers and promotions, training and accidents.[6] However, many firms have special problems which can be handled better by forms tailor-made to fit the particular circumstances. The changing of forms to cover loopholes discovered by experience is common practice.

The *application* form is often loaded with unnecessary details, some of which are objectionable to the applicant. Some state laws have forbidden many application questions about race, religion and organizational memberships. Formidable looking applications hinder recruitment, lose time and confuse the main purpose.

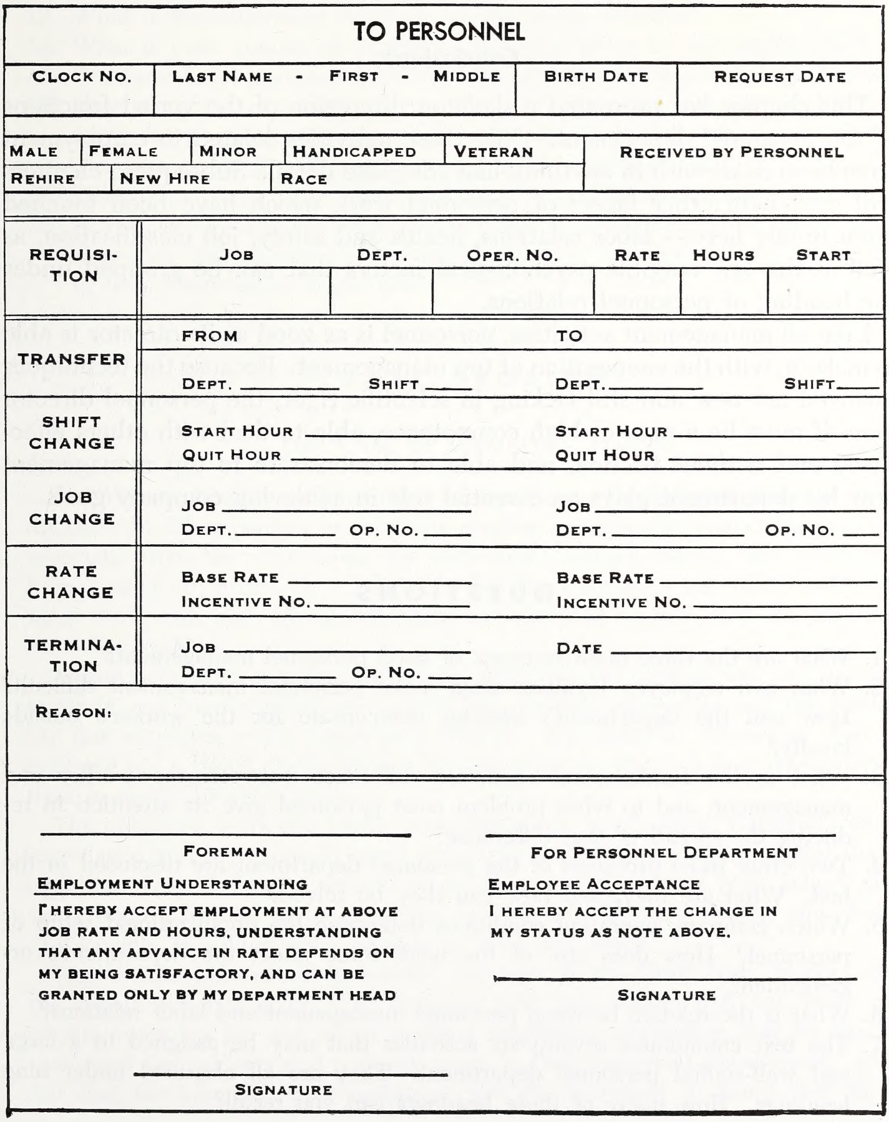
---

[6] The American Management Association has published a *Handbook of Personnel Forms and Records* (Research Report No. 16). This contains forms for 137 different records.

A *combination-purpose* form can usually be prepared to take care of several personnel records. When they are applicable, they help reduce the

FIGURE 20.5

Combination-Purpose Form



TO PERSONNEL

CLOCK NO.	LAST NAME - FIRST - MIDDLE	BIRTH DATE	REQUEST DATE

MALE	FEMALE	MINOR	HANDICAPPED	VETERAN	RECEIVED BY PERSONNEL
REHIRE	NEW HIRE	RACE			

REQUISITION	JOB	DEPT.	OPER. NO.	RATE	HOURS	START

TRANSFER
FROM: DEPT. ______ SHIFT ____
TO: DEPT. ______ SHIFT ____

SHIFT CHANGE
START HOUR ______ QUIT HOUR ______
START HOUR ______ QUIT HOUR ______

JOB CHANGE
JOB ______ DEPT. ______ OP. NO. ____
JOB ______ DEPT. ______ OP. NO. ____

RATE CHANGE
BASE RATE ______ INCENTIVE NO. ______
BASE RATE ______ INCENTIVE NO. ______

TERMINATION
JOB ______ DEPT. ______ OP. NO. ____
DATE ______

REASON:

FOREMAN

FOR PERSONNEL DEPARTMENT

EMPLOYMENT UNDERSTANDING

I HEREBY ACCEPT EMPLOYMENT AT ABOVE JOB RATE AND HOURS, UNDERSTANDING THAT ANY ADVANCE IN RATE DEPENDS ON MY BEING SATISFACTORY, AND CAN BE GRANTED ONLY BY MY DEPARTMENT HEAD

SIGNATURE

EMPLOYEE ACCEPTANCE

I HEREBY ACCEPT THE CHANGE IN MY STATUS AS NOTE ABOVE.

SIGNATURE

bewildering multiplicity of forms for employee transfers, changes involving shifts, jobs and pay rates, and terminations, as well as a brief statement of the hiring understanding. Figure 20.5 illustrates this type of form which was drafted and used successfully by the writer. When it is advisable to have any one kind of transaction on a separate record for analysis and control, that particular type can be posted to a weekly or monthly summary sheet. When different forms are used for this group of personnel transactions, it is customary to file each type separately for possible future study. However, in actual practice the combination form often saves time, in addition to reducing the number of forms.

Conclusions

This chapter has presented a skeleton discussion of the varied functions of the personnel department. Only those activities related to employment have been dealt with in anything like adequate detail. Subsequent chapters will deal with other facets of personnel work which have been touched upon briefly here — labor relations, health and safety, job classification, as well as the less tangible psychological factors that can be grouped under the heading of personnel relations.

Like all management activities, personnel is as good as its director is able to make it, with the cooperation of top management. Because the techniques involved are new and still lacking in scientific rigor, the personnel director himself must be a man of high competence, able to deal with others effectively and without friction, and able to demonstrate to top management how his department plays an essential role in achieving company goals.

QUESTIONS

1. What are the three main supports of good personnel management?
2. What two employee loyalties often make personnel management difficult? How can the department's director compensate for the worker's outside loyalty?
3. What is the fundamental economic difference between the worker and management, and to what problem must personnel give its attention in reducing the spread of that difference?
4. Two other basic problems of the personnel department are discussed in the text. What are they, and how can they be solved?
5. Which company operating conditions determine the organizational setup of personnel? How does size of the work force affect the department's organization?
6. What is the relation between personnel management and labor relations?
7. The text enumerates seventy-six activities that may be assigned to a large and well-staffed personnel department. They are all classified under nine headings. How many of these headings can you recall?

8. How would you arrange to "let the worker in on the know"? Assuming that knowledge of certain kinds of company happenings promotes a feeling of worker-belonging, what types of information should management share with employees, and how should the necessary communication be established?
9. Why are unions opposed to paternalism?
10. What background training would normally help qualify a personnel director? What natural characteristics would you expect in a successful director? How would you find out whether he possessed those characteristics?
11. What is the relation among job analysis, job specifications and man specifications?
12. To what extent do you feel that tests, other than trade tests, are dependable for ranking a group of candidates who take them?
13. What is the difference between validity and reliability?
14. What is your opinion of personal references given by job applicants?
15. What outstanding guides would you use in determining placements, and why?
16. How would you provide for transfers and promotions in advance of openings? How would you gear a training program to your plan, and what association would it have with horizontal job relationships?
17. What items would you eliminate from the typical application form?
18. If you have access to some compilation of personnel forms (such as the American Management Association's), try your ingenuity at combining three or four forms into a single one.

CASE PROBLEM

THE CASE OF CALDWELL MASON

Mr. Wilson, employment manager at the Vicery Department Store, is having difficulty in filling worker requisitions coming in from the various departments, especially from the warehouse. He feels that Caldwell Mason, who answered a help-wanted ad, might be a possibility for the warehouse job which calls for a stock clerk with high school education and ambition to take over the inventory-control records.

Mason, who is twenty-five and single, filled out the application, took physical, aptitude and psychological tests, gave two personal references and the name of his last employer — the Craft Iron Works. His personal references were his minister and a friend of his father. He was asked to return in four days, allowing time to check his references.

The minister's reply was highly complimentary, emphasizing Caldwell's church attendance and his generally good reputation. His father's friend stated that he had seen very little of Caldwell since his graduation from high school seven years before, but he understood that he was not living at home, and that he quit his job "in a huff" after holding it "only four years."

Mr. Wilson phoned the personnel manager at the Craft Iron Works, where the report was not good. The manager said that Mason had too many complaints about his job and about working conditions, explaining that for the past two years he had operated a punch press in their basement department. Mason felt that the job was too monotonous and the basement so damp that he lost time from head colds during the winter months. He had continually asked to be transferred to a more interesting job on the ground floor, in spite of the fact that he was a better than average press operator. It was also stated that Mason had no complaint about his wages, which were on an incentive basis, and that he had said he was even willing to take less pay at an hourly rate, which indicated lack of initiative.

At the second interview, Mr. Wilson explained to Mason the opening in their warehouse and the opportunity it offered for advancement to the person who could qualify. Mason appeared pleased. Then Mr. Wilson asked him to explain why he was not living with his parents, since he was not married, and why he left the Craft concern. Mason said that he rented a room two years ago to be near his work, which was a forty-minute trolley ride from his parents' home.

His reasons for quitting Craft required a lengthy recital, to which Mr. Wilson listened without comment except to encourage him by asking from time to time whether there were any other reasons. Mason said that the personnel manager at Craft's placed him originally at cleaning machines, without any kind of test or examination. He admitted his complaints about the uninteresting press job and the damp basement in which the punch presses were located. He also said that after carrying his lunch for the first two years, while he lived at home, he ate at a restaurant six blocks from the plant, which required him to eat in a hurry. He explained that the machinists' union had been asking the Craft company for two years to set up a plant cafeteria for its two hundred workers.

Mason also stated that he averaged two weeks' lost time each year he worked in the basement at Craft's, and two more weeks during their end-of-the-year shutdown. His other complaints were of a minor nature, but there were several of them.

The Vicery tests showed satisfactory physical and psychological results. Mason's aptitude test indicated a fitness for clerical rather than mechanical work. The person who reported on the psychological examination indicated that Mason's failure to marry before he was twenty-five might be explained by selfishness and introversion.

PROBLEM. If you had Mr. Wilson's responsibility, would you employ Mason for the warehouse job? Explain the reasons for your decision.

CHAPTER 21

Personnel Relations

By giving this chapter the title "Personnel Relations," we automatically imply that we are going to be discussing something distinct from "Personnel Management." The fact is that in practice the two areas are so closely related that it is not always easy to say where one leaves off and the other begins. In a large organization, both areas are the concern of the personnel department; in a very small organization, both tend to be the responsibility of the boss. Nevertheless, if we are to understand the full complexity of the personnel function in management, it is analytically important to make some such distinction — whatever words we use to designate the two approaches.

What differentiates the two is the *immediate goal* to which either approach is addressed. For present purposes, we may say that personnel "management" aims to build an efficient organization for the accomplishment of company objectives through the judicious manipulation of men. The techniques of personnel "relations," on the other hand, are addressed most immediately to creating and maintaining a harmonious group of satisfied employees. That is to say, personnel management stresses the achievement of company objectives; personnel relations stress personal satisfaction.[1]

Personnel management and personnel relations are frequently fused in practice, because often the same technique will satisfy both goals at once. The bulk of the previous chapter was given over to a description of the employment activities of personnel. Emphasis there was laid upon the first goal — attaining an efficient organization from management's point of view through proper techniques of matching personal qualifications with job specifications. In the effort to attain this goal, the second objective — that of satisfying the worker — was also served, for there can be no doubt that a man is likely to be happiest in a job for which he is best qualified. There is no intrinsic contradiction, then, between the two approaches.

---

[1] The choice of the terms personnel "management" versus personnel "relations" is arbitrary. There is little agreement in the literature on what to call these two approaches, although there is increasing recognition of the value of making such a distinction. Cf. F. J. Roethlisberger and William J. Dickson, *Management and the Worker* (Cambridge, Mass.: Harvard University Press, 1939), p. 552: "An industrial organization may be regarded as performing two major functions, that of producing a product and that of creating and distributing satisfactions among the individual members of the organization. . . . The second function, while it is readily understood, is not ordinarily designated by any generally accepted word. It is variously described as maintaining employee relations, employee good will, co-operation, etc. . . . [This second function is] concerned with the maintenance of a kind of social organization in which individuals and groups through working together can satisfy their own desires."

And yet the difference is real. In the case of personnel's employment activities, it is very clearly the interests of the organization and not those of the individual that take precedence. If an applicant for a job in a shoe factory is found to be highly expert in the shaping of canoe paddles, and the company does not happen to manufacture canoe paddles along with shoes, it does not therefore add them to its line of goods merely to give the new employee the satisfaction of working at his highest skill. The man must be fitted to the job, not the job to the man.

On the other hand, when the same company provides its workers with balls and bats and mitts and lays out a baseball diamond on its own property, it is eqully clear that this expenditure does not directly aid in the manufacture of shoes. In the background of such activity lies the proposition that productivity is likely to be highest when the employees, taken both individually and in groups, are happiest; but the immediate end of this expenditure is not to aid the production process but to maintain a harmonious group of workers.

The problem of personnel relations, then, is to discover the sources of an employee's personal adjustment to his work situation as well as the sources of dissatisfaction. Only with this knowledge at hand, can the personnel department begin to exercise anything like full control over the all-important question of productivity.

It is not difficult to understand why the subject of personnel relations has assumed such significance in recent years. From the standpoint of most employers, labor is a prime cost. For the average employee, the job consumes more time than any other single activity in his life. Second only to his family, his job should provide him with personal satisfaction and a sense of security. Without these, his productivity is almost inevitably going to be low.

Motivating productivity

It is the special province of personnel relations to improve productivity through increasing the worker's interest in his job. Personnel departments have commonly tried to stimulate worker interest through such rewards as incentive pay, extended vacations and various types of insurance. All of these have their effect while the worker is *off* the job. Even incentives stimulate interest in the pay check, rather than in the job itself.

It is not our purpose here to try to isolate the secret of on-the-job motivation for productivity — whoever does so will be richly rewarded. But we have arrived at the point where we are confident that the stimulation of individual job interest is the only dependable path to maximum productivity. And we know, further, that a worker's social relations on the job, his interactions both with management and fellow workers, are immensely important in creating and maintaining that motivation, even if we can offer no precise formulas for ideal personnel relations.

The problem should be seen in its historical setting. When workers were skilled artisans, they were naturally interested in their product because it was palpable evidence of their personal skills. The Industrial Revolution undermined this worker interest by transferring his skills to the new machines. Because machine operators frequently matched the products of their skilled predecessors simply by pulling levers, a decline in job interest was a natural consequence. Motivation was maintained to some degree by the personal relationship of the worker with his foreman. To him the foreman was the company, and in that sense the worker still retained a personal interest in his shop associations if not in his product.

The next deadening effect on job interest was caused by large-scale production. It was a blow to the worker–foreman relationship and to the foreman–management association. Industrial functionalism relieved the foreman of more and more of his activities until finally little was left except his responsibility for production. With hiring, firing, promotion, inspection and other functions assigned to staff groups, the worker gradually began to look on his foreman as a more or less helpless cog in the management machine. With the decline in his responsibilities, the foreman's authority was curtailed to the point where he was merely considered the first among equals with his workers.

The personal worker–foreman association was supplanted by a worker–staff association. The staff end of this new relationship precludes any possibility of personal intimacy. In fact, the worker seldom sees any of the staff members who pattern most of his work. He does not know the names of the various staff functions or the names of the individuals who direct them. He knows only that his foreman is boss in a very restricted sense, and that his production orders are planned and controlled by some unseen force.

Personnel is trying to find something to recapture the worker's interest in his job, an interest which has been slowly losing ground since machine production absorbed such a large part of his former skill. Our relatively feeble progress measures the difficulty of the task. The basic trouble probably lies in our applying piecemeal remedies without having made a fundamental diagnosis. This chapter must content itself with a discussion of some of the better methods currently being used to stimulate an awakened worker interest.

Building Morale

For the purposes of personnel relations, morale may be defined as *the degree to which the worker finds satisfaction in doing the things that are* *expected of him.* This definition is not so simple as it may at first appear. The fact is that a worker may be the focus of more than one set of expectations. We shall be using morale to refer to the worker's state of satisfaction in performing the tasks assigned to him by *management.* But often the informal worker group will evolve a set of expectations quite different from management's. It is a not uncommon practice in production industries for a group of workers to agree among themselves on what constitutes a fair day's work; then, if any individual exceeds the quota set by the group, he is liable to sanctions from the other members — he will be labeled a "rate buster," or he may be ostracized from the social life of the group. Adherence to the norms of the informal worker group may very well be a manifestation of high morale from the standpoint of the group and of low morale from the standpoint of management.[2] Thus personnel must attend to the workers not only as individuals but as members of informal groups. The ultimate goal must be to make the many component groups of the organization want to do the things which will best serve company interests. But this is more easily said than done, and there must be much more research in the area of group dynamics before management can expect any definitive answers.

The components of morale

F. J. Roethlisberger compares "morale" in industry to the concept of "health" in medicine.[3] The resident physician of a hospital does not ask the nurse, "What is the state of health in the ward tonight?" He inquires after the health of individual patients. He has no cure for sickness in general but only for specific illnesses. Similiarly in business and industry, if personnel is to do anything about morale, it must be able to go beyond the statement that "morale is low" and find out in what particular respects morale is low. Each case of low morale must be seen as a particular illness requiring its own special treatment.

Experience has shown that within any group of employees there are a number of specific morale builders, and sometimes an even larger group of morale destroyers. One of the fundamental purposes of personnel relations is to add impetus to the morale builders while minimizing the effect of morale destroyers. From this standpoint, personnel must operate throughout the entire management group, with particular emphasis on the foremen. Without such plant-wide cooperation, the department will not get very far with a morale-building program.

What are some of the morale builders and destroyers over which the foreman has at least partial control?

---

[2] Another example of "high morale" which is not oriented to management's goals would be the case of the workers' whole-hearted participation in a strike. Here the satisfaction is derived from fulfilling the expectations of the union leadership.

[3] See *Management and Morale* (Cambridge, Mass.: Harvard University Press, 1941), pp. 189–194.

A Group of Experienced Foremen Report [4]

Morale Destroyers	*Morale Builders*
Favoritism and nepotism	Square dealing with workers
Religious and fraternal preference	Setting good example
Display of anger by supervisors	Recognizing ability — giving credit
Hasty and unwise decisions	Encouraging individuals
Wage discriminations	Planning department's work
Lack of punctuality	Keeping tools in condition
Untidiness in the shop	Encouraging suggestions
Agitation and rumors	Safe working conditions
Carelessness	Good housekeeping
Unfulfilled promises	Posted promotion programs
Jealousy	Encouraging loyalty
Dishonesty	Encouraging cooperative spirit
Evidences of prejudice	Equitable wage programs
Hasty and unfair discharges	Maintaining discipline
Belittling management policies	Giving clear instructions
Paternalism	Keeping all promises
Too many bosses	Avoiding mixed responsibilities
Too much display of authority	Maintaining strong leadership
Poorly maintained equipment	

Induction

An employee's first few days on the job can leave lasting impressions. Small concerns can accomplish satisfactory induction through the friendly attitudes of old-timers in their associations with the newcomer. The personnel department can be a great help in indoctrinating old employees with this helpful approach to the new worker. In large companies, induction, or indoctrination, has a greater effect on employee morale than is generally believed. One source suggests seven ways to "handle with care" the new worker:[5]

1. *Greet him cordially,* making him feel that he is exactly the person needed for the job.
2. *Show sincere interest* by discussing information obtained from personnel prior to his reporting for work.
3. *Explain the importance of his job* and the high standards of your department.
4. *Show him around,* to the time clock, first aid, rest room, equipment and facilities.
5. *Introduce him to fellow-employees.*
6. *Help him get instructions for the new job.*
7. *Visit him* during the first week on the job.

---

[4] This information was contributed by a group of some seventy-five foremen, selected from industries in Dayton, Ohio. The foremen had an average service of about twenty years. They were members of the National Foremen's Association. The writer conducted a series of weekly conferences with this group on "Management for Foremen."

[5] *The ABC of Supervision* (Urbana, Ill.: University of Illinois, Business Management Service Bulletin No. 106, 1949).

Besides welcoming the worker to the group, induction should provide information about the company, including its history and products. Explanation of the facilities and services as outlined in the handbook should be a part of the induction process. Working hours, rate, time and place of pay, rules for absences, rest periods and vacation plans are examples of information desired by the newcomer.[6]

In well-managed companies, special rooms equipped with charts and moving picture equipment are in charge of trained instructors. These facilities may be used for job instruction and training as well as for induction.

One automobile manufacturer, with a four-hour instruction program, devotes the first hour to introductory statements, answering questions and letting the newcomers know where they can find answers to the problems not discussed. The second hour is given over to a plant tour. The third is devoted to short talks by the nurse, the safety engineer, and the suggestion supervisor. The final session "touches on the more detailed and personal aspects of the employee's relationship with the company."

Communication

An American Management Association survey suggested that the most pressing industrial relations problem is the need for better communications between employer and employee. Communication can and should operate both vertically and horizontally. Vertically, it carries information from management to workers, and vice versa. Horizontally, it means that individuals on the same levels of management should communicate ideas of mutual or company interest. Communication on all levels, and in both directions, is absolutely necessary to good morale.

Management should have daily contacts with its subordinates all down the line. Foremen should keep workers informed of company plans and policies as they have been received from superiors. It is also the foreman's duty to see that messages about what the worker is thinking, questioning and planning, go up the line for management's consideration and action. It seems obvious that communication up and down and across is necessary if a spirit of belonging is to be built within an organization. Management "sharing" is a vital stimulation to employee "belonging."

How is adequate communication to be developed and practiced? There are literally dozens of ways. Top and middle management will seem less remote to the workers if they walk through the plant from time to time. Surveys of foremen opinion lead to suggestions for better communication. Management discussions with employees about company affairs can be important, as the president of Jack & Heinz so ably demonstrated. His "us and we" talks to all plant employees over the intercommunication system developed such *esprit de corps* among the company's "associates" (employees) that they actually defended their management against public criticism. Letters from the president of the concern to the workers' homes about company matters, or personal birthday and holiday messages, are factual and social communications of high merit.

---

[6] One company's induction bulletin, entitled "Glad to See You," lists twenty-five things the new employee needs to know.

The extent to which top management communicates with all its levels, including foremen, often sets the pattern for the foreman's communication attitude with his workers. Management dinners, forum discussions, speaker meetings and periodic week-end conferences promote intraplant communication downward from the foreman level.

Suggestion system

There are two ideas behind the suggestion system. The apparent purpose is to increase productivity, reduce costs and accidents and make the work environment more acceptable. The less apparent purpose is to stimulate personal participation in company affairs. Improved employee participation often has more valuable long-term results than the financial rewards for successful suggestions. The cash goes to the winner, but the spirit of the contest permeates the group.

The suggestion system has many boosters and critics. That it can be beneficial is attested by the number of large and successful concerns which have stayed with the plan. The list of officers and directors of the National Association of Suggestion Systems is a miniature roll call of big business. Early experiments with the suggestion idea proved that there are many paths leading to failure. In the first place, it must be conducted along technical lines and not as a side show. It requires selling to start with and good management for continued success. Merely fastening up suggestion boxes filled with blanks, and providing for confidential depositories is not enough.

Suggestion systems are not so beneficial to small companies whose workers have face-to-face access to top management. But in large concerns the impersonal approach is the only alternative. To operate a successful suggestion system in a large company, a full-time manager is required. There must be competent technical evaluation of the suggestions and there must usually be group decisions about putting the suggestions into effect. The kind of awards and the way in which they are presented can make or break the idea. What to pay for acceptable suggestions should be a matter of announced policy; the awards usually range from 10 to 20 per cent of the first year's savings.

The suggestion system has four general purposes:[7]

1. To save time and money
2. To improve operations
3. To keep supervisors alert
4. To improve employee relations

---

[7] From an address by H. L. Kirk before the Suggestion System Association, in Pittsburgh, in 1945. Published by the Association in pamphlet form.

It is the last of these which chiefly concerns us here. To be successful, the system must have top-management support, be properly organized with attractive rewards, have prompt action in accepting and rejecting ideas and receive proper publicity.[8]

The morale survey

The morale survey attempts to measure employee thinking concerning company operations and management. It is used to discover those conditions, physical and human, which cause good or bad morale. In so doing, the survey points out the situations which are influencing worker attitudes. It can be applied to management as well as to the workers. Management attitudes are important because of their influence on worker actions. When a reasonable number of workers complain about a given situation, management has a definite problem for correction. When a good morale survey is followed by an objective analysis, management has an excellent opportunity to review its strong and weak points, and do something about the latter.

A morale survey should not be rushed into blindly. A poor survey will depress worker morale. It must be planned to fit the situation where it is applied. In general, these surveys may be made by questionnaires or interviews. While the former method is quicker and less expensive, the latter obtains more accurate and usable information on which to base analyses and conclusions. There are two types of interviews — the structured and the unstructured. The former asks definite questions and records the answers; the latter allows the interviewed employee to develop freely his own line of discussion.

In addition to these plans for measuring employee morale, the foreman may attempt the survey by recording observations on the job, or an experienced observer may be placed on a job with the group he is observing. Whiting Williams of Cleveland has written up many of his experiences with this participant-observer type of morale survey.[9]

There are a number of firms making professional morale surveys. Besides the many benefits derived from their experiences with different types of business concerns, they have the advantage of being relatively unbiased from the employee's point of view. This factor helps promote belief in the confidential nature of the replies given by the workers. Few employees will give opinions freely if they think that management is able to identify them. Properly conducted and professionally analyzed, surveys point out annoying situations, many of which are reasonable subjects for attention. To the extent that this is true, they also reduce employee grievances. In addition, they point the finger of responsibility at those foremen and executives who cause poor worker morale.

---

[8] Successful ideas receive awards from $5 upward. In 1952 the Tennessee Coal and Iron Division of the U. S. Steel Company paid $10,000 to a section foreman for his drawing which showed how to achieve a continuous flow of broken coal from the miners to the mine car.

[9] See *What's on the Worker's Mind* (New York: Charles Scribner's Sons, 1920) and *Mainsprings of Men* (New York: Charles Scribner's Sons, 1925). One of these experiences was a fairly long employment in the coal mines of Wales.

Stock ownership

In the early twenties there was a decided spurt in the sale of company stock to employees. In some cases the price was made attractive to hasten the process. Management figured that morale and productivity would be improved and employee dissension minimized if the workers participated in company ownership. This morale-boosting idea scarely had an opportunity to prove its worth by the time the depression of the 1930's scored a knockout blow. Employee investors out of jobs fell back on their stock purchases to find that the market values were far below costs, even when there was a market. Workers felt that management had "taken them for a ride." This situation was so general that the stock-ownership plan for employees appeared to be definitely out for the future.

Recently, however, a steady rise in the stock market and national protective legislation have established a belief that the 1929 disaster cannot happen again. So we are experiencing a new stimulation of employee stock ownership. In a recent survey, *Business Week* suggested some new ideas affecting the present situation.[10] The declining value of the dollar makes common stocks a partial hedge against fixed-dollar pension plans. General economic education has convinced many workers that they too have a stake in our economic system. Finally, promotion of many executive stock-option plans has convinced rank-and-file employees that they should participate in such deals.

Currently, there are three distinct types of employee-savings and stock-purchase plans. One combines stock purchases with stock option. Another is essentially a savings plan with stock-purchase features. The third is a profit-sharing trust that buys company stock for investment. The Sears Roebuck trust owns about 23 per cent of the company's common stock. The employee-stockholders do not get their certificates but they have received excellent profits on retirement. Many companies allow workers to withdraw investments before the stock is paid for, with or without interest, and at least one company agrees to buy back employee-owned stock at the purchase price.

The present stock-purchase plans are still on trial, with attractive features not found in the plans of the twenties. A few companies have discontinued employee stock-purchase plans within the past few years, while just as many which started during the early trials are still operating. The Procter & Gamble plan has been in operation for sixty years. American Telephone & Telegraph has found the idea profitable, selling nearly two million shares to employees in five years. Three million more shares were allotted for employee purchase in 1952. Early in 1950 the publisher of *The Milwaukee*

---

[10] *Business Week,* No. 1230 (March 28, 1953), pp. 130 ff.

Journal wrote in a letter to employees: "We of the *Journal* staff are convinced that no small share of this newspaper's continued growth, as well as its widely recognized excellence of news coverage, is due to the extra effort of those who are its owners as well as its employees."

Conclusions

There are basic principles for the successful functioning of all human relations. In personnel relations they may be summarized as follows:

1. *Fair wages, hours, and working conditions* are fundamental considerations, not only from the standpoint of human relations, but for maximum productivity.
2. *Make the worker feel worth-while.* Too often management relies entirely on the pay check, which many surveys show is not the primary worker consideration.
3. *Keep the worker informed.* The extent to which this principle should be carried depends on the circumstances, but it is evident that ignorance breeds suspicion, a poor foundation on which to build satisfaction and productivity.
4. *Eliminate paternalism.* The worker is not interested in management's "gifts." It should be realized that neither pay nor any other consideration earned by the employee is a gift from management or from the owners of the enterprise.
5. *Encourage participation in policy formulation.* When company policies are guided by basic principles they cannot get out of hand. On the contrary, participation in policy-making begets participation in its effective application. Group participation of employees in personnel policy-making and the formulation of rules and regulations for the operation of such policies is generally less "radical" than management suspects. The progress of employee participation in this field frequently demonstrates a higher level of worker intelligence than anticipated.

Personnel Services

Working conditions

The plant that is a good place to work attracts the best employees and builds team spirit. Team spirit increases productivity, and productivity makes profits. It is of paramount importance, therefore, that the plant should provide pleasant surroundings. What are some of the things that create such an atmosphere?

In the first place, the *location of the plant* is important. It should be easily accessible by some inexpensive form of public transportation. Provision for loading and unloading workers under shelter from bad weather conditions is another desirable feature of a transportation plan. Adequate parking space on the plant grounds is a matter frequently dealt with by union committees.

Passenger tunnels leading to various departments within large plants are a convenience in saving time and the irritations of crowding. Tunnels within and between plants also serve company interests by minimizing production interferences caused by going through other departments.

Washrooms that are convenient, sanitary and commodious are absolutes in modern business. The improved examples of the past few years have set a standard which companies must meet today if they wish to attract and hold good employees. Plenty of space to change clothes, adjacent to lockers, and with adequate ventilation are also necessities.

Good *color schemes* have both physical and psychological value and reduce accidents. *Lighting standards* minimize the fatigue that follows eye strain. Care of the eyes is emphasized in the Western Electric Company's new electronics plant, where lighting fixtures are recessed in an acoustic ceiling.

Individual *bench lamps* facilitate work on assembly jobs. *Magnifying glasses* are provided to ease the strain of close work. In the past few years much headway has been made in the reduction of *dust, dirt,* and *fumes,* even in foundries. Finally, *noise control* is receiving scientific attention, in the interests of both the workers and the company.

Economic security

There is an expanding group of economic services performed for employees by the personnel department. They include financial aid or subsidies to meet various personal contingencies. Aids in case of accidents, loss of health, old age and death may also be classified as economic. In recent years employers have been recognizing their financial responsibility for certain types of worker discharge, especially technological unemployment, where the worker himself is not to blame.

Group life insurance and hospital and surgical plans are often financed in whole or part from company funds. The Social Security Act has assigned to the employer financial obligations which have added to the duties of the personnel department. Company pension plans have become expensive items. Because the NLRB decided (1945) that even voluntary plans requiring no employee contribution were "a condition of employment," they were made subject to union bargaining. Based on this finding and the Supreme Court decision (1948) in the Inland Steel case, large unions have demanded and secured pension plans.

Recreation and social programs

It is estimated that recreational programs cost business about four hundred million dollars a year. Such an expenditure should go a long way toward improving health and morale, although when carried to excess the results may be just the opposite. For example, a medium-sized industry decided to spend whatever was necessary to establish itself in the amateur baseball world. It imported players and gave them time cards in one of its high-wage departments. The time cards were rung in and out by a clerk in that department, including enough overtime to meet the salary agreed on. The company team won some desirable championships, but at the expense of the general recreation program. In addition, management's total disregard of its own rule against ringing others' time cards was a distinct morale destroyer. Recreation based on semiprofessional athletics is rarely worth what it costs, and is sometimes worth less than nothing.

Sponsorship of the recreation program often determines its morale and health values. The program which is sponsored and financed by management is not likely to receive enthusiastic support from the workers. The John Hancock Mutual Life Insurance Company has an employee recreation association which handles all sports, picnics and social features for its four thousand members. A twelve-man board of directors conducts such an efficient organization that its income from dues and benefits makes it self-supporting. Ford Motor Company has the largest of the management-financed programs. It is operated by the Recreation Section of the Employee Service Department under the leadership of about fifteen full-time directors. Most company programs are planned for full employee participation, which requires a variety of sports and social activities, such as bowling, softball, golf, basketball, archery, and scores of others, including even a sling-shot club. The Mallory Company of Indianapolis sponsors a duplicate-bridge league and fox-hunting club.

The success of recreation and social programs depends largely on employee participation. People who work and play together will develop mutual understanding and respect. It may even be a morale booster to see a management team go down to defeat, especially when the play is sprinkled with humor. Social contacts among employees and with management, are helpful when they are properly conducted. However, there are instances where late dances, with poorly considered refreshments, interfere with rather than boost the next day's production. Ill-advised social affairs are more likely to promote friction than harmonious employee relations. In a national survey, management ranked the promotion of sports at the top of its list of activities for improving employee social relations.

Food services

In the survey referred to above, both unions and management rated plant cafeterias in second place among activities useful in promoting employee morale. Unions and management are likewise convinced that food services should be the responsibility of management. Labor has definite ideas about the requisites for good company cafeterias, but it has no desire to participate in their management. Labor is equally sure that it wants company cafeterias to operate at cost, fearing that a company loss may be used as a bargaining point in contract negotiations. Both workers and management have agreed that it is a good idea for them to eat together — once in a while.

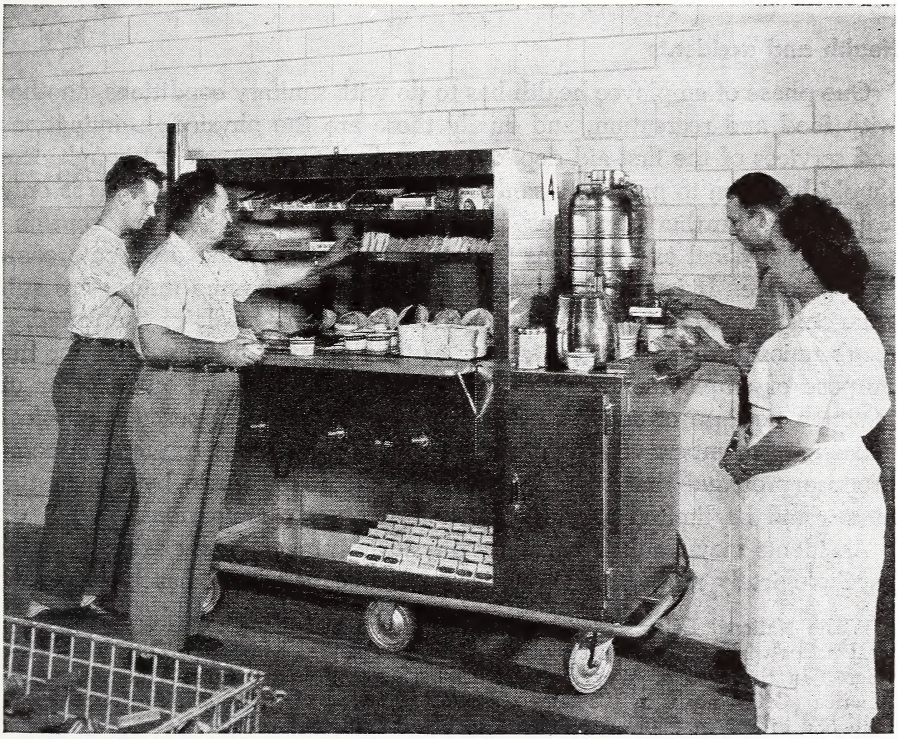
There is a definite trend toward professionally operated cafeterias, with management paying a fee for operation while maintaining control over menus. Cafeteria concessions to outsiders are rapidly becoming a thing of the past. With company control, it is understood that management absorbs any deficit resulting from cafeteria operations.

Based on the finding that workers produce best at the beginning of each shift and then taper off, there is considerable scientific support for snack periods in the middle of the morning and afternoon. This is an old custom among British workers who demand their afternoon tea. It has become a custom among our government employees for both mid-morning and afternoon revitalizing. The current proposal is that the lunch period be shortened to half an hour and the saved time be divided between the two snack periods.

Mid-morning and afternoon snack periods may be spent in the plant cafeterias, or be serviced from outside restaurants on wheels, from inside mobile food carts (see Figure 21.1), or from so-called coffee tote boxes.

FIGURE 21.1

Electrified Food Truck



Courtesy: United Food Management Services, Inc.

In some cases, vending machines serving sandwiches and hot and cold drinks are scattered throughout the plant or offices, to save time. Professional food services cater to office buildings and industrial plants for all of these plans.

Company cafeterias have become such a vital part of business that the NLRB has recognized the union's right to bargain about the price of meals.[11] Some of the by-products claimed for cafeteria services are:

1. Higher productivity
2. Reduced labor turnover
3. Less absenteeism
4. Fewer accidents
5. Better worker-supervisor relations
6. Healthier employees
7. Improved company loyalty
8. Better applicants for employment

With the idea of promoting these benefits, both the food and the dining rooms are receiving more attention from specialists. Tables of varying sizes, appropriate decorations and relaxing music are important elements of the cafeteria atmosphere. Strict cafeteria sanitation has largely eliminated mice and vermin in all parts of the building. Departmental hot plates, with their fire hazards, are no longer necessary, and they are prohibited by some concerns.

Health and accidents

One phase of employee health has to do with sanitary conditions, another with food and recreation, and finally there are the physical examinations and services of the first-aid department and visiting nurses. Although care should be taken to provide a sanitary environment for workers, this is only a first step. Further steps must be taken to protect the workers from one another. Physical examinations for contagious diseases have become common practice. It is surprising, however, to find that some unions are still antagonistic to certain medical examinations. Many locals of the foundrymen's union (AFL) forbid members to take physical examinations for the purpose of employment. This attitude is evidently based on the fear of rejection because of silicosis. One local of this union opposed a physical checkup of members who reported out sick for three days or more. A compromise provided that such examinations should be made by one of the nurses and be limited to pulse and temperature examinations.

Accidents may result from faulty physical arrangements, or they may be psychologically motivated. For many years management has been giving serious engineering attention to the elimination of physical hazards, to the comparative neglect of the human causes. The contributions of the personnel department to the reduction of accidents and the maintenance of health will be treated at length in Chapter 23 on Health and Safety.

---

[11] The National Labor Relations Board approved bargaining rights about cafeteria meal prices when the plant was so remote that employees had little choice to go elsewhere. In the case of Weyerhaeuser Timber Co. vs International Woodworkers of America (CIO), heard in 1950, the company increased the price of its cafeteria meals from 55¢ to 85¢ in ten-cent jumps. The Board held that "conditions of employment encompass many noncompulsory aspects of the employer–employee relationship."

Personal sales

Department stores started the practice of selling their goods to employees at a discount. The savings from purchases, sometimes paid for by deductions from weekly pay on an installment basis, were considered a part of the wage. Various retail and wholesale houses picked up the idea, restricted to sales from their own merchandise. Finally, industry followed suit, buying the items sold to workers from vendors, on the company account.

Sales to employees at discounts present little difficulty when the employer has the merchandise in stock, but when this type of employee service must be performed by the company's purchasing department, it presents so many difficulties that it often causes more bad feeling than good. The typical purchase of the industrial employee has a value far above the average price of articles bought by employees from the stock of their retail or wholesale employer. It is usually selected from a catalogue. Because the employee does not have a chance to inspect this item before he buys it, he is frequently dissatisfied with it after he receives it. Furthermore, because of the relatively high purchase price, installment payments may be necessary, and these must be financed by the employer. As a result of these selection and payment problems, personal buying by industrial concerns for their employees is not generally popular.

Grievances and Discipline

The methods of handling grievances will be dealt with in the following chapter. But from the standpoint of the personnel department's services, grievances are made unnecessarily burdensome because they represent one of the union's causes for existence. Since labor organizations service grievances, their leaders must be continually alert to discover membership dissatisfaction. Unions contend that a grievance is any member dissatisfaction, while management prefers to define it as a worker complaint that cannot be corrected by his foreman. The issue is clear cut, with the labor leader quite naturally leaning toward the definition which will furnish grist for his mill.

On the justifiable supposition that most grievances remain small if they are settled quickly, some personnel managers decide to cruise through the plant making themselves available for worker complaints. The idea is to bring submerged complaints to the surface so that they can be dealt with before they grow into group grievances. On the surface, this plan appears excellent, but in practice it sometimes floods the personnel hopper with imaginary and even trumped-up complaints, occasionally stimulated by union stewards.

Disciplinary measures, or punishments for violations of the regulations, should be made an integral part of company rules. It is good practice to grade disciplinary actions not only with respect to individual rules, but also according to the number of violations. For many rules, the punishment has three grades, such as reprimand for the first offense, layoff without pay for the second offense and discharge for the third offense. One company cites disciplinary measures as "one week to discharge" and "reprimand to discharge" leaving the degree of punishment largely to the discretion of the disciplinarian. It is better to make the punishments more specific on the basis of the number of offenses. Another company numbers its rules from one to four, explaining that No. 1 means a "Pink warning in writing"; No. 2, a "Yellow warning in writing"; No. 3, "Lay-off not exceeding six days"; and No. 4, "Discharge." Offenses like theft of the company's or a fellow employee's property call for immediate discharge.

Rules and regulations

Occasionally, rules are divided into two types, as "General Rules" and "Rules for Personal Conduct." It is the latter type that provides for disciplinary action. There may be as many as forty punishable offenses, of which the following are examples:

Falsification of records
Ringing another's clock card
Using another's pass
Reporting late to work
Leaving without permission
Possession of weapons
Refusal to obey orders
Throwing refuse on floors
Violation of safety rules
Making unnecessary scrap
Horseplay of any kind
Intimidating employees
Posting or removing notices
Loitering in washrooms
Sabotage
Restricting output
Fighting on the premises
Failure to wear badge

Frequently the personnel director tries to have company rules and regulations made an integral part of the contract agreement. Unions are opposed to this plan on the grounds that rules are a strictly company affair and they do not want to be considered as an official participant. From management's point of view, rules and regulations must be geared to situations which are subject to change, making flexibility a desirable factor. As a result of these two attitudes, the nearest the rules and regulations get to the labor contract is in the appendix. In most cases the rules for employee conduct are published in a separate pamphlet.

Absences

Absences interfere with work distribution in all departments, but are particularly hard on production. It is the personnel department's duty to keep absenteeism to the minimum, a job which starts with finding out the causes. The difficulty with analyzing absences arises from the proverbial unreliability of the reported causes. One personnel director summarizes the chief causes in four groups: illness, attending sports, oversleeping and shopping tours. The best way to check faked illness is to dispatch one of the plant's visiting nurses to assist the unfortunate. Because she occasionally learns from neighbors that the absentee is attending a movie, some union locals resist the use of these "veiled detectives."

The trouble with the sportsman is that he is an absentee problem only during certain seasons. At other times he has an excellent record. One suggestion for this group is to declare a plant holiday on some of the offending "opening days." The "Monday morning deep freeze" of the late sleeper is another difficult case. Some departments have enlisted the assistance of the wife or mother with fair success. The worker who takes off a day or two to spend accumulated earnings is an economic problem. It may be helpful to dole out an enforced vacation so that he will accumulate an economic deficit!

Exit interviews

The personnel department's analysis of reasons for separations is important in eliminating some of their causes. Frequently the leaving employee, wanting the separation concluded as quickly as possible, develops a reason that sounds plausible and eliminates further questioning. With the true facts at hand, personnel is frequently able to make suggestions for such things as improved shop conditions, pay increases to meet community rates, changes of foremen, and so on.

Women in Industry

Although it is sometimes contended that women in industry should be treated differently from men because they are unaccustomed to heavy and dirty work, the fact is that in many societies at different times women have done the difficult and monotonous jobs while the men hunted. Furthermore, modern industry is continually eliminating the drudgery of production so that women can fill many jobs with comparative ease. The U.S. Bureau of Labor Statistics estimated that the female civilian labor force in 1950 amounted to about eighteen million.

Whatever differences exist between men and women in industry, they create problems primarily for personnel management and the foremen. What are these claimed differences that frequently result in pay differentials for what are assumed to be the "same jobs?" One is physical strength. Women worked in foundries for the first time during World War II, and the International Foundry Workers Union demanded the same pay for men and women workers on the same jobs. Because many states have laws fixing the maximum weights that can be lifted by women, heavy moulds or castings were reserved for the men, who felt that such discrimination should demand pay differentials. In the new foundries, weight-lifting is being eliminated for both groups.

It has sometimes been argued that there are inherent differences in mental capacity and psychological reactions between men and women, and that these differences are all in the men's favor. There is some evidence that women have longer memories than men, but for the most part psychological testing has demonstrated only that men are more likely than women to have acquired the types of knowledge and skill which are most immediately relevant to success in business and industry. The longer women remain in the business world, the more such differences will level out.

Marriage and maternity have brought new problems to business. Should women quit work when they marry or when they have children? On the whole, business and industry are progressively doing what they can to give a negative answer to both questions. Many companies follow the practice of the Swisher Cigar Company of Jacksonville, Florida, which has provided nurseries, where mothers pay three dollars a week for the "twenty-four hour children" and two dollars a week for the "day children." The fees are paid for food, supervised play, nursing attention and the use of cribs. The company reports that the fees are not intended to cover the cost of the services. Figure 21.2 shows the rooftop playground, which is one of the nursery facilities supplied by the Swisher Cigar Company.

Irrespective of the claims and counter-claims, the personnel manager has a problem in any special treatment to be accorded women. It is an individual consideration for different businesses and in different parts of the country.

Conclusions

Daniel Katz and Robert Kahn, of the Human Relations Program at the University of Michigan, have published several articles on a four-year study concerning motivating workers for productivity.[12] They dealt with worker interest rather than worker rewards, finding that the latter had little effect on individual productivity. They observe that industry has attained its present productivity by organizing itself like a machine, to which individuals do not react favorably. They discuss at length the changed status of the foreman in his relations to the workers. Depersonalizing foreman contacts by instituting staff agencies is decried, as is the present functioning of the suggestion system which lacks proper motives for offering ideas.

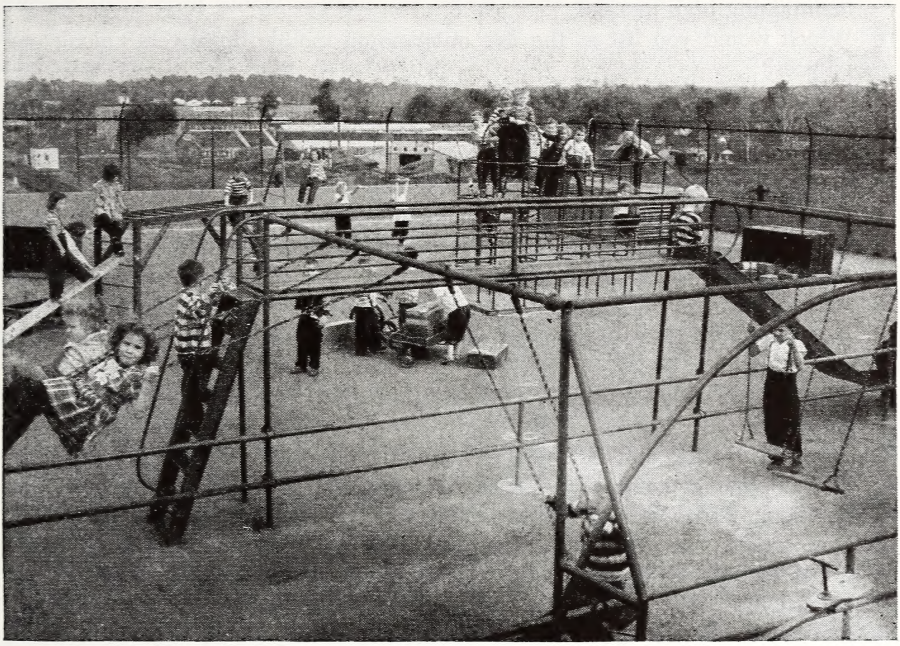
Personal prestige, a sense of achievement and group approval must be personnel's aims for cultivating happy workers and high productivity. There

---

[12] Much of their research is summarized in: Daniel Katz and Robert L. Kahn, "Some Recent Findings in Human Relations Research in Industry," in G. E. Swanson, T. M. Newcomb and E. L. Hartley, eds., *Readings in Social Psychology* (Rev. ed.; New York: Henry Holt & Company, 1952), pp. 650–665.

FIGURE 21.2

Roof Playground for Workers' Children



Courtesy: Swisher Cigar Company

is no known formula for producing worker satisfaction with mechanized jobs; the problem must be approached from the human side. It is suggested that morale campaigns and suggestion systems "kill the mosquito, but fail to halt its breeding." Complete mechanization will minimize industry's human problems, but those workers who transfer to service and distribution fields will carry along their problems.

Personnel directors of the future will probably be groping for a way to infuse worker interest through some type of group dynamics. Such experimentation may require some fundamental changes in the general organization structure of business.

QUESTIONS

1. What is the essential difference between personnel management and personnel relations?
2. Why is it, in your opinion, that paid holidays, paid vacations and company-sponsored pension plans do not increase the worker's happiness on his job? If you think that these management benefits do increase the worker's happiness on the job, how can you demonstrate it?
3. Why has the worker-foreman relationship become less effective in increasing the worker's happiness on the job?

4. How would you define morale?
5. In what way does the fact of group membership complicate the problem of maintaining high morale?
6. Which would you list as the five outstanding morale destroyers among employees?
7. What items would you include in a program for making new employees satisfied that they had selected you as their employer?
8. What is meant by vertical and horizontal communications, and how are they developed?
9. What would be your reasons, as an employee, for actively participating in your company's suggestion system? What features would be necessary in such a system to arouse your interest?
10. How would you organize and operate a morale survey to produce the maximum results? How would you use the answers which the survey analysis produced?
11. Criticise the Sears Roebuck profit-sharing trust from the standpoint of an employee.
12. What advantages and disadvantages do you feel would accrue from employee participation in company policies? How would you provide for such participation, and what limitations would you impose on their operation?
13. How would you organize and operate a company athletic program? What sports would you include, and what restrictions would you impose on their operation?
14. Do you think that the company should lose money on the operation of its cafeteria for employees? On what basis would you allow the union to participate in the formulation of its policies or management?
15. To what extent would you put into force a compulsory health program for the workers? Would you also make the program compulsory for the management group?
16. Compare the advantages and disadvantages of personal sales to employees in an industrial concern and a department store.
17. Would you encourage the expression of employee grievances? If so, why, and if not, why not?

CASE PROBLEM

The Fireball

Joe Stahlman has been with the Portland Engineering Company for twenty years, starting as a pattern-maker at the age of eighteen, with a high school education. Due to natural ability, study and interest, he soon became one of the best pattern-makers in the area. He was worth a higher hourly pay than the union's journeyman rate, but the company was bound by its wage contract, so could not give him the hourly rate it felt his services were worth. Furthermore, World War II was in progress, and all wage increases had to be submitted to the NLRB for approval.

Joe was capable of long hours of work, and frequently worked as many as one hundred hours in a seven-day week. For such a work-week he received over $200. He was temperamental above the average, and the company was frequently faced with the possibility of losing his services because of his continually asking for a higher wage rate, which had to be refused, and because he had difficulty getting along with fellow workers, of whom there were about one hundred on the day shift and seventy-five on the night shift. Also, Joe knew that he was the best workman in the shop, and that his repeated threats to quit disturbed the shop superintendent, as well as the president of the company, who was formerly a journeyman pattern-maker.

First the company tried to solve Joe's wage difficulty, and retain his expert services, by assigning him as part-time overseer of the fifteen apprentices, at a 10¢ an hour wage differential. His ability, speed and temperament made him a poor teacher. He had no patience with the learners, demonstrating the tricks of his trade with so much speed that they were loath to admit that they did not understand what he did or how he did it. The apprentices registered numerous complaints with the superintendent, and finally with the union committee.

Later the company assigned Joe to foremanship on the night shift, in another effort to retain his services. This job made him technically a part of management and paid 20¢ an hour differential over the journeyman rate. On this new job, Joe was exacting with the journeymen both in the quantity and quality of their work. As night foreman he had to go on inactive status with the union, where he was formerly an influential member and at one time president of the city's seven locals.

Finally, the union brought Joe to trial for "working against his brothers." He was cleared of the charge by the examining committee, whose report was sustained by a membership vote of a bare majority.

PROBLEM. If you had over-all responsibility for the management of this shop, what course of action would you take with respect to Joe Stahlman, assuming that you wanted to retain his services?

CHAPTER 22

Collective Bargaining

It is difficult to decide which is the outstanding problem of modern business, but negotiation with employees comes close to the top with many concerns. Bargaining collectively by employees is a natural consequence of the disadvantages of their dealing with employers as individuals. Individual negotiation becomes very difficult as business units expand to the point where management loses personal contact with the workers. Since the advent of collective bargaining as a legally recognized and government-encouraged plan for labor–management negotiations, the range of subjects dealt with has been continually expanding. The coverage is now so inclusive of total business operations as to make labor negotiations a highly complicated phase of management. Even though this situation is generally recognized by those who have learned about it through experience, it is amazing how little attention the textbooks on management devote to collective bargaining.

The background of collective bargaining

By 1791 the carpenters, shoemakers and printers had formed local organizations in Philadelphia, New York and Boston to bargain collectively. These early unions sought shorter hours, higher wages and minimum rates, apprenticeship regulations and "exclusive union hiring," which came to be known as the closed shop.

In the early 1800's, collective bargaining was frequently used in labor–management disputes. The first recorded bargaining conference between representatives of the employer and employees took place in Philadelphia in 1799, to discuss demands of the shoemakers. Similar bargaining meetings soon followed in Philadelphia and New York with the printing crafts.[1]

The "trampling committees" of those early unions checked the employers' wage records to see that they complied with the bargaining agreements. These unpaid union agents were replaced by paid "walking delegates," who in turn gave way to the full-time "business agent" with increased responsibilities.

---

[1] *Brief History of the American Labor Movement* (U. S. Bureau of Labor Statistics, Bulletin 1000, 1951).

As labor organizations expanded their influence and demands, employers formed defense associations especially to combat wage demands. Bitterness on both sides led to the employment of professional "strikebreakers" by management and "goons" by the labor organizations. Both of these trouble-making groups were frequently armed, with results that attest to the disastrous effects of the failure to bargain collectively in good faith.

Development of collective bargaining

The Noble Order of the *Knights of Labor,* founded in 1869, was the first national union to attain any marked degree of success. It started with the Philadelphia local of garment workers and expanded slowly into other crafts. For about ten years this organization functioned as a secret society with an elaborate ritual. It operated secretly because of management's bitter antagonism toward unions, which found expression in the blacklisting of trade-union members.

With a membership of about 10,000 in 1880, it claimed 700,000 by 1886. The organization maintained centralized national control over its locals, in contrast to the large degree of local autonomy now practiced. Its chief purpose was to reconstruct society on a cooperative basis to replace the existing competitive structure. This plan did not allow the Knights of Labor much time for collective bargaining. Rather, they attacked "the money power of the banks" through the establishment of producer and consumer cooperatives. The Knights did, however, make certain demands of all employers, including the eight-hour day, equal pay for equal work by men and women, abolition of child and convict labor and public ownership of utilities, but they used only educational and political methods to further their purposes.

Although strikes did not fit into their basic scheme, they engaged in a short series of strikes to obtain better wage agreements with employers. Their successful strike against the strong Gould railway interests in 1885 brought them considerable prestige.

Decline of the Knights came primarily through internal conflicts between those members who favored collective bargaining and those who were determined to change our economic society through political channels. Another conflict developed between those who favored an industrial union of the skilled and unskilled, and those who sponsored separate craft organizations. The Knights started on the downgrade after the organization of the American Federation of Labor in 1886, but continued in existence until 1917.

In 1881, six fairly strong craft unions — the printers, iron and steel workers, molders, cigar makers, carpenters and glassworkers — met at Pittsburgh to form the Federation of Organized Trades and Labor Unions, with the announced goals of higher wages and better working conditions. With about

45,000 members, it remained relatively weak as a national organization during its first five years of life. But when in 1886 the Knights of Labor, at their national convention, refused to recognize the jurisdiction of the large craft unions, a group of these unions joined with the FOTLU to form the *American Federation of Labor.* The AFL began with approximately 140,000 members. By the outbreak of World War I, its membership had increased to 2,000,000, and this figure had doubled by 1920.

In 1920 the AFL was the dominant union in this country, numbering about 75 per cent of all organized workers. The only important unaffiliated groups were the four railroad brotherhoods. The outstanding industrial union was the United Mine Workers, which was the largest AFL affiliate when it joined, in 1902. From this time until the beginning of World War I, union–management dissension increased measurably. The three outstanding reasons were the large increase in power of the unions, the number of bitter strikes in which persons were killed on both sides, and the rise of scientific management, which was strongly opposed by organized labor.

For these three reasons, collective bargaining was largely in abeyance. It was also retarded by some opposition within the AFL, and strongly opposed by the Socialist Party, the Socialist Labor Party and the Industrial Workers of the World. The socialist groups followed checkered careers of opposition and penetration. The IWW was a militant organization bent on abolition of the wage system. Organized on an industrial basis, its tactics aroused public antagonism to such an extent that it was outlawed in several states. After a number of its leaders were sentenced to long jail terms for violence, the IWW, which had once been a serious rival of the AFL, started a sharp decline about 1913.

The next outstanding event in the field of organized labor came with the formation of the *Congress of Industrial Organizations,* in 1938. Its establishment arose from a dispute within the AFL concerning the admission of industrial unions. Because the AFL was composed almost entirely of craft unions, and because membership in a craft union generally required a high degree of skill, there were thousands of semiskilled and unskilled workers in the mass production industries who were not eligible for craft union membership and consequently had no effective instrument for collective bargaining with their employers. At the 1934 convention of the AFL it was recognized that some provision must be made for the admission of industrial unions, which would bring together all the workers in a single industry regardless of their degree of skill. During the following year, the AFL granted charters to industrial unions in the automobile and rubber industries, but craftsmen were excluded from them. This exception merely intensified the differences, so that the question again became prominent at the 1935 convention, where a defeated minority report demanded unrestricted charters for mass production industries.

Shortly after this convention, six AFL unions formed the Committee for Industrial Organization, to promote the unionization of the mass production industries, for inclusion within the AFL. After the group was joined by four additional AFL unions, the executive council of the AFL asked that it disband, which it refused to do. Its member unions were consequently expelled from the AFL at its 1936 convention. As a result of this action, the Committee was transformed into the Congress of Industrial Organizations and held its first convention in 1938. It was set up as a loose federation of autonomous national unions, governed by a central board composed of representatives from its affiliates.

The split between the AFL and the CIO greatly increased the total number of organized workers. It also led to a new emphasis on collective bargaining, resulting in many new contracts for higher wages and improved union security.

In the intervening years since 1938, various attempts were made to amalgamate the AFL and CIO. The joint committee appointed for that purpose (1953) appeared on the surface to have opportunities for success. However, differences in fundamental organizing plans, the disputes about top jobs in the new union, jurisdictional differences, disputes concerning craft and industrial unionism, and union finances presented problems that made success appear anything but bright.

Nevertheless, both of the organizations approved unification at their 1955 annual conventions, and ratified the general contract terms which had been worked out previously by an executive committee representing both groups. Early in December 1955, the 10 million members of the AFL and the 5 million members of the CIO formally merged to form the AFL–CIO. George Meany of the AFL became president of the new organization, and Walter Reuther, president of the old CIO, became head of a new Industrial Union Department. The executive council was made up of the President, the Secretary-Treasurer, and 27 vice-presidents, of whom 17 were from the AFL and 10 from the CIO. At the time the CIO was organized, craft unions dominated the labor scene; therefore, it is interesting to note that at the time of the merger in 1955 two-thirds of the members of the new group were covered by industrial unions, only one-third by the craft unions.

There will be plenty of trouble within the new organization. The many sore wounds developed during the past twenty years will heal slowly. There will be at least local political differences between the newly federated groups. One of the outstanding problems of the federation will be in the national political field, where the CIO has been distinctly Democratic in its leanings, while the AFL has remained neutral for the most part.

There will probably be fewer strikes, but they can be more prolonged because of the improved financial condition of the union's "war chest." More intensive bargaining drives will be initiated, especially by the industrial union department.

Employers will be affected differently by the various national union components of the federation. Wage disputes will be largely developed by the different nationals because of their freedom from restraint by the new federation in this portion of their work. John L. Lewis' United Mine Workers and the railroad brotherhoods are not now included in the new federation, and are likely to remain out of it.

Collective bargaining and the law

The attitude of the law toward collective bargaining may be divided roughly into six periods:

1. Before 1840 —— Repression
2. 1840 – 1914 —— Toleration
3. 1914 – 1932 —— Encouragement
4. 1932 – 1947 —— Promotion
5. 1947 – 1953 —— Encouragement
6. Since 1953 —— Neutrality

The first labor law of record is the Statute of Laborers, passed by the English Parliament in 1351 to stabilize wages which were getting out of hand because of a short labor supply following the Black Death. Part of this statute, and many others that followed, declared that any combination of workers for collective bargaining was unlawful, and the courts held that any combination of workers for joint action was a criminal conspiracy. As the principle evolved, all agreements made by worker groups for higher wages or shorter hours were declared illegal and void. The records show that the principle was applied in this country prior to 1840, when the right of workers to combine for the improvement of wages, hours and working conditions was generally recognized.

During the second period, the government neither encouraged nor discouraged unions, and the courts no longer held that union activities, including strikes, were criminal conspiracies. Because of the absence of specific legislation, the courts were often called on to decide whether picketing, boycotts and blacklists were legal. Injunctions were frequently obtained against labor union actions, but here again it was the court, not the government, that was making the decisions.

Several Acts of Congress encouraged unions and collective bargaining between 1914 and 1932. In 1890, the Sherman Anti-Trust Act forbade combinations in restraint of trade. When the courts applied this prohibition to unions in the famous Danbury Hatters Case, the unions were strong enough to influence public opinion and Congress so that they were specifically excluded from the provisions of the Sherman Act by the Clayton Act of 1914. This was the beginning of government encouragement of the unions, particularly in the area of collective bargaining.

In urging the cooperation of labor during World War I, the War Labor Board specifically recognized the right of unions to solicit members. This decision put the government on labor's side to the extent of serving notice on management that it discriminated against organized workers at its peril.

The Railway Labor Act of 1926 expanded labor's rights by stating that railway workers could choose their own bargaining representatives. Another feature of the Act which promoted collective bargaining was outlawing of the "yellow dog" contract by which workers promised as a condition of their employment that they would not join unions.

The Norris-LaGuardia Act (1932) stated that "yellow dog" contracts could not be enforced in federal courts. In addition, it provided for limitations of the courts' power to issue injunctions in labor disputes. The Act also reiterated the right of the organized worker to designate "representatives of his own choosing . . . for the purpose of collective bargaining."

The National Industrial Recovery Act took another step forward in encouraging bargaining. Its famous Section 7a granted employees the right "to organize and bargain collectively through representatives of their own choosing . . . free from interference, restraint or coercion." By this time the government was well on its way in encouraging collective bargaining. The Fair Labor Standards Act of 1938 fixed minimum wages and regular hours for persons employed in interstate commerce. The Public Contracts Act (Walsh-Healey) and the Davis-Bacon Act applied provisions of the Fair Labor Standards Act to government contracts and construction work.

The National Labor Relations Act, known as the Wagner Act, was approved in 1935. It represents the high point of government encouragement of the unions. It prohibited employers from interfering with the organization of unions or from refusing to bargain collectively. It named five types of unfair labor practices forbidden to employers, against which "cease and desist" orders would be issued. In fact, this section of the Act was so enforced by the National Labor Relations Board that employers were practically prohibited from expressing any opinions against organized labor.

The pro-union policy of the national government continued until the passage of the Taft-Hartley Act (1947), the purpose of which was to reestablish a balance between the collective bargaining powers of employees and employers. A portion of the Act expresses this purpose: "To insure that the rights of the individual employee and of the public are protected against abuses on the part of either labor or management." Its chief feature for accomplishing this end is the enumeration of unfair labor practices for labor, to balance those already provided for management under the Wagner Act. The Taft-Hartley Act is a revision of the Wagner Act, which remains on the statute books.

Contract Negotiations

Collective bargaining is supposed to result in a labor–management contract. If not, its controversial features may have to be settled through arbitration, action by the NLRB or, as a last resort, by an economic contest — the strike. Collective bargaining finds its real and highest test in the arguments, diplomacy and compromises which make up the contract negotiations.

The contract purports to spell out a meeting of minds on activities affecting both employers and employees. It represents the high point of collective bargaining, especially since its provisions fix the rules that shall govern the relations between the two groups for at least a year.

The contract phase of collective bargaining is necessarily conducted by representatives of organized labor and management. Management representatives are appointed by top management, usually headed by a person who is acting as the director of labor relations. Labor's representatives, called the bargaining committee, are selected by vote of the membership. The union committee may be guided by its chairman or by a professional representative of the international union. It is not unusual for both sides to be assisted by legal counsel whose duty should be to inform his client in matters of law and procedure. However, it often happens that attorneys take an active part in the negotiations, frequently to the detriment of the management group.

Most shop committees working on contract negotiations are suspicious of the good faith of the legal fraternity. A general feeling of mental inferiority on their part makes most union members distrust any contract provision written by a lawyer. One committee member, when asked whether he would agree to a certain contract provision, gave a negative answer. Asked whether he understood it, he replied, "Yes, I understand it in English, but I'm afraid there may be something hidden in there, and I will not make any decision."

Anyone with an extensive experience in labor contract negotiations often recognizes the relative disadvantage of the company's lawyer. He is a general practitioner, or corporation attorney, on a fee basis. The union's attorney, on the other hand, specializes in labor law and labor negotiations at a full-time salary. He was probably a labor negotiator before he studied law, for the avowed purpose of representing unions in negotiations. He knows more about labor law and labor negotiations than the average company's attorney can hope to learn from his limited practice in this highly specialized field. The company that believes such a difference exists often engages a management consultant who has also specialized in collective bargaining. Such a bargainer has the advantage of specialized knowledge of labor law, combined with a wide bargaining experience. Not being an attorney, he is also less objectionable to the labor group.

When members of top management who are not specialists in labor negotiations participate in contract negotiations, their superior authority can have a detrimental psychological effect on the attitude and approach of management's labor relations director, as well as add to the distrust of the labor committee members. In addition, these top-management members of the negotiating team will occasionally make a suggestion that leads the negotiations in the direction desired by the labor group. When such contingency arises, labor is quick to drive a wedge in the new opening. Not being conversant with the plays and counterplays of labor negotiations, management leaders often do not appreciate the opportunitiese they unwittingly give to labor's negotiations. When these occasions arise, management's director of negotiations is put in the embarrassing position of explaining what his superior meant — an interpretation which occasionally surprises the superior into future listening.

The customary approach to contract bargaining is for the labor group to submit a list of its "demands" to management, either before or at the first meeting. Management is immediately put on the defensive in resisting demands, which is a purely negative approach to its bargaining. The advantage of the positive approach has been recognized by organized labor for a long time, through constant analysis of its experiences. Even in "good faith," labor bargaining soon becomes a matter of compromises on both sides. But when management has no positive proposals, it has nothing with which to trade in compromise. It is recognized, therefore, that management better serves its interests by presenting its "demands" to labor, either before or at the first bargaining meeting. With this idea in mind, management might like to know at least the number of labor's demands before negotiations start, so that it will have an equal number for subsequent trading purposes.

With the present development of collective bargaining, both sides have started to recognize the value of presenting "proposals" rather than "demands." Only psychology is involved, but it is good psychology. Since negotiations progress in inverse ratio to the amount of heat engendered, it is desirable to keep the meeting on a factual and amicable basis. A recess for coffee and sandwiches, or refreshments, served at the negotiating table with both sides present, often lowers the temperature of the discussions and provides a fresh start. When this lull in the proceedings is used for telling stories, as it often is, both sides are agreeably surprised at the sense of humor just beneath the surface, and the resulting atmosphere is conducive to a more rational approach to the problems involved.

Contract Provisions

Contract provisions have increased in number and content as the problems of mass production, big business and distribution have multiplied. Typical contracts cover from fifteen to over one hundred pages, depending roughly on the size of the company. Examination of the contract of a typical large concern with several thousand employees shows eighteen specific provisions with a nineteenth entitled "General Provisions," a sort of carry-all for minor considerations. Another contract, of a relatively small company, has fifteen provisions besides a final section, also entitled "General Provisions." Twelve sections are common to both of these contracts. What are some of the contract provisions, and what disposition do they make of the problems involved?

Purpose. A General Motors agreement with the United Electrical, Radio & Machine Workers (CIO) illustrates the typical purpose clause.

> The purpose of this Agreement is to provide orderly collective bargaining relations between the Corporation and the Union, to secure a prompt and equitable disposition of grievances, and to establish fair wages, hours, and working conditions for the employees covered by this Agreement.

Recognition. The recognition clause starts with some such statement as: "The Company recognizes the Union as the collective bargaining agent for all employees included in the ——— department (or classification) with the following exceptions. . . ." The list of exceptions is important. Here the attempt is made to exclude everyone who may act in any managerial capacity for the company. This section usually provides for the loss or suspension of union status for those promoted to supervisory positions, and it should also provide for their reinstatement if they are returned to the ranks.

Discrimination. Here the company agrees that there shall be no discrimination against any employee because of his membership in the union or because of his acting as an officer, or in any other capacity, on behalf of the union. It is an affirmation of a section of the Wagner Act, and as such is obligatory on the company, irrespective of its inclusion in the contract.

Union Security. This provision recognizes two possible phases of company obligations. One has to do with the type of "shop" which is recognized, and how the type will be determined. The other states whether or not the company will deduct union dues from the pay of its workers for transmission to the union's representative, and under what conditions.

Representation. This section deals with the number of union members who shall serve as its representatives throughout the concern. It often provides for the maximum amount of time that these representatives shall use in serving union purposes on company time. It also arranges for meetings between company representatives and the union's grievance, shop and other committees. Sometimes it provides for the method of selection of union committee members.

Recognition of Rights. While most contracts still spell out the "rights" of management and labor in the contract, it is coming to be recognized that because labor's rights are continually expanding as the result of administrative rulings and judicial decisions, rights expressed in the contract may be relatively short-lived. In general, the union has the right of noninterference by management, and of appeal to the grievance procedure on practically any disputed question.

It is customary to define management's rights in the agreement, particularly since they are not all given specific attention in the statutes. The Sorg Paper Company of Middletown, Ohio, has the following provision in its contract with the United Paperworkers (CIO):

> It is recognized that the management of the Company, the control of its properties, and the maintenance of order on its premises, are the sole responsibility

> of management. Other rights and responsibilities belonging solely to management are hereby recognized, among which, but by no means wholly inclusive, are the rights to decide the number and location of plants, the amount of supervision necessary, machinery and equipment, products manufactured, process of manufacturing, designing, engineering and the control of raw materials, and products which may be incorporated in production. It is further recognized that the responsibility of management for selection and direction of the work force, including the right to hire, suspend, or transfer, to relieve employees from duty because of lack of work, or for further legitimate reasons, is vested exclusively in the Company.

Should this provision appear too detailed, be it known that this agreement contains another paragraph of equal length concerning productivity and the elimination of waste. There is some question among professionals whether such a listing of management's prerogatives actually restricts its rights to those enumerated in the contract. For this reason some companies express management's rights in more general terms.

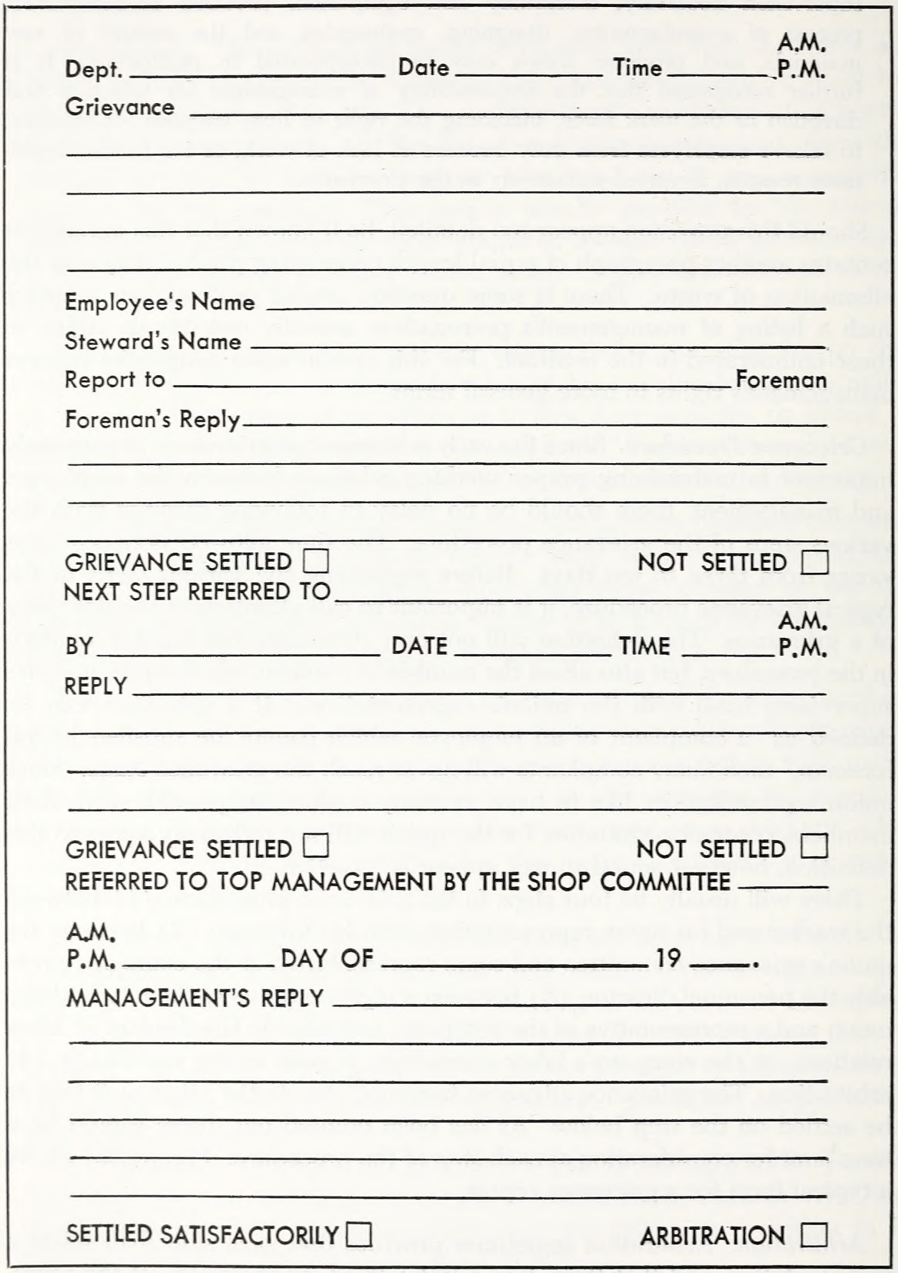
Grievance Procedure. Since the early settlement of grievances is extremely important in maintaining proper working relations between the employees and management, there should be no delay in following through with the various steps of the grievance procedure. The time allowed between steps varies from three to ten days. Before explaining the various steps in the typical grievance procedure, it is important to call attention to the definition of a grievance. The definition will not only determine the number of steps in the procedure, but also affect the number of contacts which management's supervisors have with the union's representatives. If a grievance can be defined as "a complaint of an employee which cannot be satisfied by his foreman," then many complaints will never reach the grievance stage. Since union representatives like to have as many contacts as possible with their members, contract negotiators for the union will not ordinarily agree to this definition, however sound it may appear in practice.

There will usually be four steps in the grievance procedure: (1) between the worker and his union representative, with his foreman; (2) between the union's grievance committee and some representative of the company, probably the personnel director; (3) between a representative of the international union and a representative of the company, customarily the director of labor relations, or the company's labor committee, if such exists; and finally (4) arbitration. The grievance advances from one step to the other as it fails to be settled on the step below. As has been pointed out, there should be a time limit for consideration at each step of the procedure. Figure 22.1 shows a typical form for a grievance report.

Arbitration. Arbitration sometimes provides that each side shall select a representative, and that these two select a third, or chairman. If the representatives of labor and management cannot agree on the third arbitrator, which is often the case, they may appeal to the American Arbitration Associa-

FIGURE 22.1

Grievance Report Form



Dept. ____________ Date ________ Time ______ A.M. P.M.

Grievance ____________________

____

____

____

____

Employee's Name ____________________

Steward's Name ____________________

Report to ____________________ Foreman

Foreman's Reply ____________________

____

____

____

GRIEVANCE SETTLED ☐ NOT SETTLED ☐

NEXT STEP REFERRED TO ____________________

BY ____________ DATE ________ TIME ______ A.M. P.M.

REPLY ____________________

____

____

____

GRIEVANCE SETTLED ☐ NOT SETTLED ☐

REFERRED TO TOP MANAGEMENT BY THE SHOP COMMITTEE ______

A.M. P.M. ________ DAY OF ____________ 19 ____.

MANAGEMENT'S REPLY ____________________

____

____

____

____

____

SETTLED SATISFACTORILY ☐ ARBITRATION ☐

tion, which maintains a panel of experienced arbitrators. The Association submits a list for examination by the two original members of the panel. If they cannot agree on anyone from the Association's list, then the practice is to ask the Association to appoint the third member. Experience suggests that since the first two arbitrators are really advocates, the purpose of arbitration would be better and less expensively served by the selection of a single neutral arbitrator.

The arbitration section of the contract almost invariably limits the subjects eligible for arbitration. Some contracts list the exceptions, while others specifically designate the arbitrable questions. Interpretation of the contract provisions is universally allowed. Compulsory arbitration is seldom mentioned in the contract, except for the purpose of specifically excluding it. Both labor and management are customarily opposed to compulsory arbitration.[2]

Seniority. Length of service, or seniority, is an important and sometimes determining factor in layoffs, promotions and transfers. The difficulties are found in practical application. To settle the question of when seniority starts for new workers, it is customary to provide that it shall apply after the worker has passed his probationary period and then date back to his original employment.

Seniority may be applied on a classification, departmental or plant-wide basis. On the job-classification basis, seniority distinction includes the qualifications and ability of the employee, as well as his length of service in the particular classification. Departmental and plant seniority may include both ability and length of service, but it is usual to fix it on length of service alone. Management often attempts to make seniority apply "when other factors are equal," but is ordinarily unsuccessful.

When seniority is applied on the three-way basis mentioned above, promotions are based on job-classification seniority, which includes the element of skill. When all the factors of job seniority are equal, then it is common practice to base promotions on departmental seniority. Correspondingly, when all factors, including departmental seniority, are equal, then plant-wide seniority may govern. These rules seem simple enough in principle, but in practice, situations are seldom found where "all factors are equal."

Application of seniority following transfer or promotion presents another problem. The usual rule is to designate the new job as "temporary" for a period of thirty to sixty days, after which the former seniority is picked up and reinstated on the new job. Application of the rule creates many heated arguments. If the transferred or promoted employee retains his former seniority, he may outrank in length of service many older workers in his new classification. If, on the other hand, his seniority must date from his promotion, or transfer, then he is in a precarious position in case of layoffs and other conditions based on seniority. It is invariably provided that layoffs are in order of low seniority, and returns to the job in the reverse order.

---

[2] For a worth-while discussion of the subject, see J. Noble Braden, "Preparing for Arbitration," *Journal of Industrial Engineering,* Vol. 4 (November 1953), pp. 8–9.

There are several perplexing applications of seniority which cannot be discussed in this brief survey of the subject. It is, however, pertinent to list some of the ordinary causes for loss of seniority.

1. Voluntary separation from employment
2. Discharge for cause
3. Failure to return after expiration of a leave
4. Remaining away from work for three consecutive days without cause or without notifying the employer
5. Remaining away from work for more than seven days after employer has given notice to return
6. After layoff for a year or more

Production Standards. It is customary in many lines of business to determine standard times for performing operations, by stop watch or otherwise. Such standards frequently lead to disagreements. Because of this fact, it is good usage for the labor–management agreement to provide that standards shall be considered temporary until they have been tried out in operations under normal working conditions. Even after they have been definitely established, union representatives may secure the right to review them with technicians of their own choosing, preparatory to making the disputed standard a subject for the grievance procedure. It is also customary for the contract to provide that no satisfactory standard shall be changed unless some important change occurs in the materials, machines or methods of the work concerned. The practical application of this important provision also gives rise to disputes, especially in borderline cases.

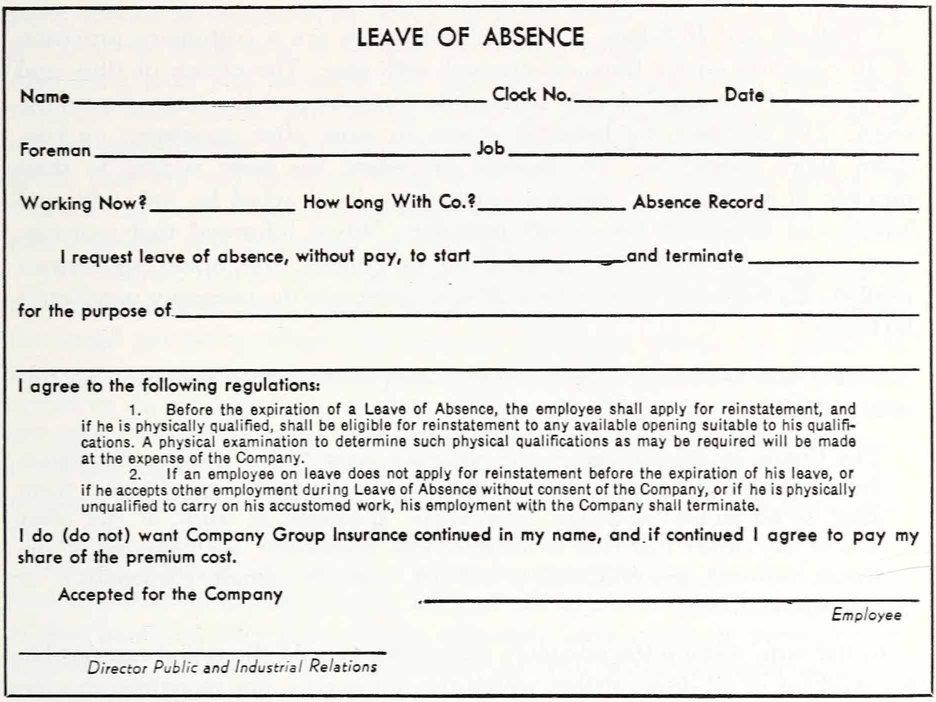
Working Hours. The hours of the regular working day are specified in all contracts for the purpose of figuring overtime and shift bonus payments.

Wage Rates and Plans. Wage rates are fixed for various classifications. It is frequently provided that new employees shall start at some rate below the minimum of their classification, but advance to the classified rate within ninety days. It is also customary to provide that women shall receive equal pay with men for comparable quality and quantity of work on the same or comparable jobs. Usually, new jobs receive temporary classifications for a fixed period, after which they are made permanent by mutual agreement of management and the union. Various incentive and apprentice wage plans are spelled out in detail in the contract. The amount of extra pay for overtime and special work shifts, as well as any premium payments, are also fixed in the agreement.

Union Bulletin Boards. Provision for union bulletin boards may seem to be an unnecessary detail for the contract, but when it is not covered by the agreement there is a tendency on the part of the union to have too many bulletin boards and to use them for purposes to which most managements would not agree. It is customary, therefore, to designate the number and

FIGURE 22.2

Leave-of-Absence Form



LEAVE OF ABSENCE

Name ____________________ Clock No. __________ Date __________

Foreman ____________________ Job ____________________

Working Now? __________ How Long With Co.? __________ Absence Record __________

I request leave of absence, without pay, to start __________ and terminate __________

for the purpose of ______________________________

____

I agree to the following regulations:

1. Before the expiration of a Leave of Absence, the employee shall apply for reinstatement, and if he is physically qualified, shall be eligible for reinstatement to any available opening suitable to his qualifications. A physical examination to determine such physical qualifications as may be required will be made at the expense of the Company.

2. If an employee on leave does not apply for reinstatement before the expiration of his leave, or if he accepts other employment during Leave of Absence without consent of the Company, or if he is physically unqualified to carry on his accustomed work, his employment with the Company shall terminate.

I do (do not) want Company Group Insurance continued in my name, and if continued I agree to pay my share of the premium cost.

Accepted for the Company

____
Employee

____
Director Public and Industrial Relations

locations of the boards and to provide that the postings must have the prior agreement of some management representative.

Leaves of Absence. This section occupies considerable space in contracts, indicating the difficulties it poses. Figure 22.2 illustrates a leave-of-absence form drawn up by the author for use in a plant employing about three thousand. Its provisions indicate some of the problems involved. Leaves for personal reasons up to about thirty days are customarily granted at the discretion of the foreman. Formal leaves are usually limited to about three months and must have management approval. In either case, seniority continues.

Sick leaves are granted automatically when supported by satisfactory evidence. Absence because of election to full-time union activity is also permissible without loss of seniority, usually with the provision that such absences be limited to one year. In all cases involving leaves, prevalent usage requires return of the employee at the end of the period, except by special permission, on penalty of being dropped from the rolls. A specific rule in most contracts provides that an employee will be discharged when the leave is obtained for the purpose of working for some other company. Absence for military service is prescribed by law, and does not affect the worker's seniority. Despite the law, "bumping" [3] by workers returned from military service has caused some nasty problems.

Vacations and Holidays. Vacation allowances are a customary provision in all contracts where they are granted with pay. The choice of time and the extent of vacations usually depend on seniority and the term of employment. The provision for holidays is easy to write after agreement on how many there should be. The Roman precedent has been adding to their number in recent years. Several years ago a local asked for an additional holiday on President Roosevelt's birthday. When informed that management was overwhelmingly Republican in politics, the union spokesman replied, "In that case, we will be willing to celebrate the company president's birthday."

Strikes and Lockouts. The following represents a broad provision on this vital subject:

> The Union, its officers, agents and members agree that as long as this agreement is in effect or any extension that may be mutually agreed upon, there shall be no strikes, sit-downs, slow-downs, stoppages of work, or any other acts of any nature that tend to interfere with production, nor picketing of any nature, however peaceful, and it will not otherwise permit, countenance, or condone such acts.[4]

In the same section the company agrees not to hold the union responsible for wild-cat or sit-down strikes which the union does not recognize or condone. The company further agrees that there will be no lockouts as long as the contract is in force. This entire set of provisions appears to be perfectly clear and binding on both parties. In practice, however, it is sometimes difficult, if not impossible, to determine whether or not the union participated unofficially in any of the various work stoppages.

General. In the case of some large companies the agreement contains what are known as "General Provisions," customarily referring to the differences between local and industry-wide contracts. Duration of the agreement may also be considered under this heading, including the conditions of operation between its termination date and the making of a new contract. Some contracts contain company rules and regulations following the official sections to which company and union representatives have attached their signatures.

Conclusions

Because labor–management contracts illustrate management's most pressing problems in the field of worker supervision and coordination, and because employees are a vital part of any business operation, the opportunity to study these agreements carefully, including the reasons for their provisions, should be welcomed by everyone on the management team. There is probably no better way of sensing the human trends in modern business. Machines, tools and materials are practically the same when they come from the same molds. But human beings are not shaped in molds. People are not only different as individuals, but what is more important to management, they are still different when dealt with as an organized group. If there is any field where management cannot depend on hunches or slide-rule decisions, it is in the field of employee relations.

---

[3] "Bumping" refers to the displacement of a worker with low seniority by one with higher seniority within the same job classification unless the contract provides for plant-wide seniority. The "bumper" is the one who takes over the job.

[4] Quoted from the contract between the Sorg Paper Company of Middletown, Ohio, and the United Paperworkers of America (CIO), dated August 1948.

The contract that results from true collective bargaining is a long step in the direction of industrial peace, which is one of our foremost prescriptions for social progress. When the contract represents merely the results of superior economic power on one side or the other, it provides merely for an armistice during which the weaker side prepares for a continuation of the struggle. History proves that where great struggles persist, one side eventually conquers to the detriment of both. In the industrial field in this country, a complete defeat by either side will vitally injure both sides, with the public suffering the consequences of this Pyrrhic victory.

Neither management nor labor seems to recognize that the final alternative to industrial peace is some form of dictatorship. With our political system based on universal suffrage, and with labor solidarity increasing its influence in political decisions, numbers may well be the determining factor. This is the prospect that management must face. At the same time, labor runs even greater risks from continued industrial conflict. It has never won anything in our time from dictatorships. Labor victory may well lead in the same direction as management victory.

Only recently have we been making studies to find out what makes for industrial peace. There are many concerns in this country which deal with organized labor on a platform of mutual confidence. Our picture seems brighter when viewed from the perspective of industrial situations in other countries. Because our industrial relations, as evidenced in collective bargaining contracts, have such a tremendous influence on our general economic, political and social systems, it is correspondingly important that the deep-seated emotional patterns on both sides be gradually exchanged for facts and the confidence to accept them. As this new pattern evolves — and it will — labor–management contracts will decrease in size and volume. Such a decrease is an indicator worth observing.

In 1951 the West German Bundestag gave trade unions the right to sit on the board of directors of coal and steel companies. These concerns were selected for the experiment because of their importance in the national economy. The formula, referred to as co-determination (*Mitbestimmungsrecht*), provides for a board of eleven members, five from labor and five from stockholders. The advocates of the idea insisted that the eleventh man be "neutral"; politicians urged that he come from the government group, and the stockholders insisted on his selection by their group. The final plan provides that the eleventh person be selected by the other ten, and if they cannot agree, then a mediation committee must present three names to the stockholders. Since this process must continue until the stockholders are presented with an acceptable choice, they actually hold the balance of power.

This return of "capital" to the dominant role, as opposed to the position which management has attained in this country through the invention of the proxy, is indeed interesting. Neither the virtues nor the deficiencies of co-determination can be weighed at this early date, but its possibilities for industrial peace are well worth watching.

QUESTIONS

1. What is the background that led naturally to collective bargaining by employees with management, as a substitute for the former plan of bargaining by the individual worker?
2. Why did the Knights of Labor place so little emphasis on collective bargaining?
3. Discuss the factors which caused the formation and rise of the AFL, and the subsequent split with a large section of its membership which formed the CIO. Was there a common cause in these two labor movements, and if so, what was it?
4. What political or other factors account for the various shifts in the attitude of the law toward collective bargaining?
5. What was the fundamental purpose of the Taft-Hartley Act in relation to the provisions of the Wagner Act?
6. What is your opinion of the advantages and disadvantages of tripartite arbitration panels? If you are opposed in general, what substitute would you suggest?
7. Do you agree with the observation in the text about the place of the legal fraternity in contract negotiations? If not, why not?
8. How would you arrange for the selection of the management representatives in labor contract negotiations? Whom would you appoint on that team?
9. What is your reaction to the presentation of "demands" by both sides at the bargaining table? What substitute plan would you recommend?
10. The text discusses sixteen labor–management contract provisions. Do you feel that labor relations would be improved by the elimination of one or more of these provisions? If so, which would you eliminate or change materially? Or would you add some provisions, and if so, what would they provide?
11. How would you handle the contract provision for management prerogatives?
12. Should a departmental transferee retain or lose his prior seniority? Why?
13. How can organized labor be related to the determination of production standards in manufacturing concerns, and to volume-of-work standards in other lines of business, so that disputes will be minimized in this controversial field?

14. Do you feel that it is unfair to restrict labor's rights with respect to bulletin boards? Give your reasons.
15. How would you devise a procedure to determine whether or not organized labor is participating unofficially in wild-cat strikes or other forms of work stoppages or slowdowns?
16. What is your opinion of the West German Government's plan of co-determination? Would you recommend its adoption in any phase of business in this country?

CASE PROBLEM

The Horner Castings Company

The Horner Castings Company is considering the advisability of eliminating its tool shop and having that portion of its work done by outside concerns specializing in tool-making. The company has been led to consider this change after some twenty years experience with its own tool shop partly because of the excessive number of grievances in the tool shop, many of which have been carried to arbitration, but chiefly because of the high costs in that department due to continued slowdowns by its workers.

The company's present contract with its industrial union provides for plant-wide seniority, so that it will be necessary to lay off a number of excellent employees in other departments in order to dismiss all of its tool-makers. The company naturally wants to avoid this undesirable situation. The change has been thoroughly discussed with the union officers and a special committee elected by the union members to negotiate the seniority dispute, about which there is a strong division of opinion among the union members. Those workers not included in the tool department, who have seniority status falling within the range of seniority of the tool-makers, will lose their jobs if the contract provisions are complied with, and they are not sympathetic to an application of the plant-wide seniority rule in this case.

The company compiled figures to show the union that it can have its tool work done at lower costs by several outside concerns.

PROBLEM. It is admitted by all concerned that the contract provision of plant-wide seniority has produced a nasty situation for both management and many of the workers. How can the problem be resolved? What would you recommend as a basis for negotiating their differences without resorting to arbitration, where the company would probably be ordered to abide by its contract?

CHAPTER 23 Health and Safety

Health and safety are closely linked in the career of every worker in industry and elsewhere. The healthy worker is less likely to be a victim of accidents, and the health of each worker is in some measure a guarantee of the health and safety of his fellow workers. Furthermore, the health and safety of every individual are an important element in our national strength.

Today there is universal agreement — although this has not always been so — that management should assume a leading role in the prevention of accidents. The constructive role that management should also play in maintaining worker health is perhaps not so obvious. Health programs of a purely remedial nature are not enough. There must be a continuous program of health research. The results of such a program not only "pay off" in increased productivity and lower unit costs; they also improve our individual and collective ability to preserve our national existence through superior mental and physical well-being.

The health and safety program

Industrial medicine first comes in contact with the worker when he applies for a job. His physical examination has three special purposes: (a) to see that he is assigned a task that fits his general physical condition, (b) to protect other workers against the possibility of contagion and (c) to protect the company against hiring workers whose physical condition may lead to accidents, or whose diseased condition may lead to later financial claims.

Added to these precautionary hiring measures, there should be a program of health education for those who are employed. The core of such education is the necessity for reporting health and accident cases while they are still considered trivial. First symptoms are the easiest to combat. Periodical physical examinations are becoming standard practice with well-managed companies. Safety education is combined with health education for two reasons. In the first place, workers in good health are less likely to have accidents. In the second place, the causes of many kinds of accidents are detectable in advance by the medical department, and hence avoidable through correction.

Because of industry's direct attack on the causes of accidents and poor health, its success in the reduction of occupational diseases has been outstanding. For example, lead poisoning in the paint industry and foundry-acquired silicosis are now the exception rather than the rule. Mechanical safeguards have been developed chiefly through studies of industrial health departments. Air conditioning, forced ventilation, sterilization,[1] sanitation and blood tests are suggestive of the means by which industry has reduced many occupational diseases close to the vanishing point.

Modern industry has added its executives to the health program. Enthusiastic about preventive programs to promote the employees' health, executives are surprisingly uncooperative in participating in such programs themselves. Conditioned by application to duty beyond the eight-hour day, they have been neglectful of their health, even with their family physicians. This executive avoidance of company health facilities has led, in some companies, to compulsory periodic examinations.

The 1951 report of the National Association of Manufacturers recommended the following essentials for a good health and safety program:

1. Adequate medical services regardless of company size
2. Services of a qualified physician and nurse when needed
3. Preplacement and periodic physical examinations
4. Properly equipped and well-located dispensary
5. Trained first-aid attendant to deal with accidents
6. Vigilantly administered safety program
7. Special training for supervisors in accident prevention
8. Employee education in safety, hygiene and nutrition
9. Control of sanitation, light, heat and ventilation
10. Records of physical examinations, accidents and absences

These guideposts supply the controls over both health and safety. A partial program weakens the final results and sometimes reflects adversely on those elements which are practiced. Industrial health programs made a bad start because they were classed as "welfare," which is anathema to both unions and management. Industrial medicine had to undergo a complete change of front before it was acceptable. Following that transition, it has become one of the major considerations with progressive companies. A decade ago, the industrial physician was avoided by the workers as the hired agent of the company who would testify against them in compensation cases. Today, the company physician is cheerfully accepted by most employees.

---

[1] The use of ultraviolet light for sterilizing the plant's atmosphere during the work day has almost as many opponents as it has proponents.

Industrial Health

Industry's interest

The Eastman Kodak Company has maintained an excellent employee health program for many years. Its handbook for workers explains in detail the services available at company expense. Progressive management has long since realized that worker health means better production at lower unit costs because it promotes the happiness of the individual. The Eastman program covers both general physical examinations and treatment; even optical, dental and dietary disturbances are treated.

The old Jack & Heinz Company of Cleveland probably had the country's most complete program for employee health during World War II. Medical, dental and eye treatments were provided on a twenty-four hour basis in company dispensaries. Because of top management's belief in the importance of proper shoes for effective work, foot examinations and shoes were also provided. To assure a proper diet, company dining rooms served balanced meals without the aid of cash registers. Bowls of vitamin tablets were available on cafeteria tables. Special baths with steam rooms and professional rubdowns were another part of the company's health program. Finally, workers showing signs of general fatigue were sent on vacations to Honeymoon Island, off the coast of Florida, where the company maintained its own establishment. When asked how the company could afford such services, President William Jack explained that "it all comes from the fund which the employees create."

In 1947 the International Ladies' Garment Workers' Union and the Associated Garment Industries of St. Louis established a health center in that city. It is supported by the participating companies on the basis of 1 per cent of the employees' earnings. More than six thousand workers are served in a specially designed and equipped building by a dozen specialists. Many other concerns have established extensive medical programs.

Industrial versus private medicine

The industrial phase of "socialized medicine" requires careful handling to keep in line with the "professional ethics" involved. To avoid criticism by physicians in private practice, it has been customary for business to encourage workers to consult family doctors of their own choice. Most industrial health departments maintain a panel of private physicians to whom workers are referred on a rotation basis when they have no established medical connection. One authority explains that

> at no time does the industrial physician attempt to urge the selection of any one physician, either a specialist or a general practitioner. Nor does he attempt to supplant the work of the private physician. This service is confined to examination, tests, to health programs, sanitation and safety work, and to emer-

> gency treatments, plus occasional treatment which must be done while the employee is at work.[2]

Although this statement is generally true, the temptation must always be strong for an industrial physician on part-time contract to add to his list of private patients from contacts made at the plant, and it would be asking too much of human nature to suppose that physicians never took advantage of such opportunities.

Direct health services

The direct and indirect aids to workers, here discussed as contributions of the industrial health service, are usually considered as programs of the personnel department. (It is perhaps more common for the industrial safety program to be a separate department.) Included among personnel's direct health services are the following five subjects:

1. *First aid and hospitalization* are the fundamental remedial functions of industrial health. These services depend on a properly equipped dispensary, together with nurses and medical services fitted to the company's size and the nature of its product. Large organizations may maintain a complete medical service, while the smaller companies restrict themselves to a nurse on a full-time basis. In such cases the physician is employed on a part-time schedule. Small adjacent concerns may pool their first aid facilities to good advantage. Pooling of general health services among local companies in the same production field will become more general simply because it offers many advantages for an extended program at reasonable cost.

2. The *recreation* program is also related to the industrial health service. While some companies still believe that outstanding athletic teams are a contribution to the employees' health through the entertainment they afford, it is better practice to include the largest possible percentage of employees in the recreation program. Recreation on a professional basis should be charged to the sales department since advertising appears to be its chief purpose.

Bowling is one of the all-employee sports which can finance itself. Golf is another industrial recreation that is gaining popularity on its own finances and momentum. Briggs Manufacturing Company is reported to have more than one hundred softball teams. Ford, Goodyear, General Electric and many other large companies finance employee sports on a large and extensive scale.

It is psychologically obvious that employee-sponsored recreation builds a better spirit than the company-financed and managed kind. An extensive employee program also permits large groups of rotating members to take part in its management, offering a satisfying opportunity for many repetitive-job workers to use initiative.[3]

---

[2] John Cameron Aspley and Eugene Whitmore, *The Handbook of Industrial Relations* (3d ed.: Chicago: The Dartnell Corporation, 1952), pp. 994–995.

3. *In-plant feeding* is no longer considered a social experiment. It is an accepted necessity for any plant, whether it is serviced by food-vending pushcarts, by the larger "meals-on-wheels" or by an elaborate cafeteria. That in-plant feeding is beneficial and here to stay is one idea on which all layers of management and workers agree. It saves time and increases productivity through improvement of health and the morale which results from leisurely association. Many unions have voted plant cafeterias second place among activities promoting morale. (Management's encouragement of unions took first place.)

After trying several plans for managing cafeterias, the accepted one is clearly operation by outside specialists under company policy and supervision. This plan pays the outside operator a fee rather than profits. Many companies are satisfied to lose money on cafeteria operations, believing that they are amply compensated on the production line. Most unions, however, favor operation at cost, fearing that the company may use the cafeteria loss as a dealing point in contract negotiations.

Container Corporation's Cleveland plant summarized the benefits of in-plant feeding as: [4]

Better plant housekeeping
Fewer accidents
Less absenteeism
Lower labor turnover
Higher morale and greater loyalty
Healthier workers
Better grade of applicants
Better foremen-worker relations

4. *Drinking water and tablets* are not the simple health services that one might assume. Besides maintaining proper pressure in angle jet fountains, management must exercise important controls to prevent this important service from becoming a menace to health. Observations made at more than thirteen hundred drinking fountains resulted in listing fourteen separate ways in which drinkers foul or contaminate the fountain bowl.[5] Some of these malpractices can be minimized by posted warnings; a new fountain design eliminates others.

The tablets distributed to employees include salt, cold, vitamin and aspirin. Salt-tablet dispensers are frequently found throughout shops where the work induces heavy perspiration. Vitamin tablets are distributed chiefly in company cafeterias. Cold tablets have been handed out generally by many first-aid dispensaries.

Reports on the effectiveness of cold tablets vary. No conclusion would be worth while unless it resulted from accurate data on a number of variables, covering reasonably large groups of those who took the pills and those who did not. The same is true of group benefits from vitamin pills. Some years ago the DuPont Company's medical department made an extensive study of the results produced by vitamin pills with large groups of its employees. The physician responsible for the study stated that the conclusions were not definite enough to be scientifically helpful.

---

[3] For further details, see "Scoring High with Your Workers through Organized Sports," *Business Week*, No. 1035 (July 2, 1949), pp. 22–23.

[4] Marshall P. Fox, "Cafeteria a Big Factor in Lowering Costs," *Factory Management and Maintenance*, Vol. 104 (October 1946), pp. 140–141.

[5] Aspley and Whitmore, *op. cit.*, pp. 1000–1001.

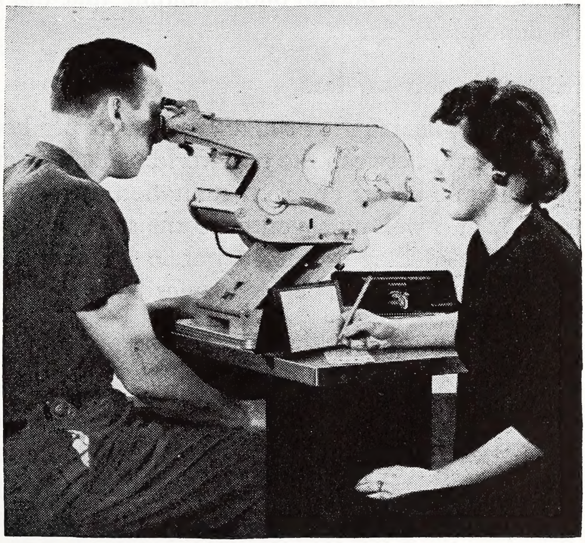
Aspirin is the favorite "Monday morning" remedy dispensed by the health department. That there are as many aspirin tablets given out on Monday as on all other days combined, is a sad commentary on the week-end habits of relaxation of a segment of American workers.

5. *Defective vision, hernia* and *bad teeth* are accepted as the most common worker defects, in the order named. As one authority stated it, "many workers are one-eyed and don't know it." Defective vision affects the accident record and production efficiency, as well as general health. Some firms have solved the problem of poor inspectors by visual correction in some cases, and elimination of the defectives in others. It is now generally conceded that enormous industrial losses have been caused by defective vision.

The Ortho-Rater, shown in Figure 23.1, is an instrument for measuring eye performance. It was used in an exhaustive series of experiments over a four-year period to determine the relation between vision and accidents. These experiments also determined the visual skills essential for different jobs. Based on the visual skills required, predictions were made about the relation between defective vision and accidents. In an 18-day test, the group with inadequate vision had 50 per cent more accidents than the standard vision group. In a 38-day test, the percentage was increased to 75.[6]

FIGURE 23.1

The Ortho-Rater



Courtesy: Bausch & Lomb Optical Co.

---

[6] See N. Frank Stump, "Industrial Safety and Visual Functions," *The Journal of Psychology,* Vol. 20 (October 1945), pp. 369–379.

A program of visual correction is a profitable investment for any concern — industrial, retail or even banking. In one industrial program, it was found that 40 per cent of the employees could not meet liberal standards. Corrective glasses were ordered for all those who failed to meet the tests and corrective goggles for those who needed them in their work. Two years later, another over-all test was made. The proportion of employees with defective vision had been reduced to 10 per cent, including those who had been tested and employed in the interval. The company reported that the quality of its product was materially improved, its productivity increased and its accident rate reduced by 27 per cent. Top-management support insured cooperation between the medical and safety departments and between the foremen and the workers. The important questions for vision correction are:

1. Is there a good visual education program?
2. Is visual analysis adequate?
3. Is job analysis adequate?
4. Is the visual environment the best possible?
5. Is the eye safety program adequate?
6. Is the visual corrective program up to date?
7. Is the entire program well managed? [7]

Applicants must be examined for *hernias* and for bodily defects which would increase the probability of contracting a hernia. The employer should see that the condition is corrected or, if this is not possible, reject the applicant altogether. Otherwise, he may later be liable to the claim that the hernia was contracted on the job. It is equally obvious that no employee can be expected to do his best when he has *bad teeth.* Corrections here are not so difficult as with the other two defects, but employment should be based on the understanding that the necessary dental work will be done promptly.

Indirect health services

1. *"Plant-keeping"* or *sanitation* had its big boost during the twenty-five-year interval between the two world wars. Ex-servicemen played some part in a new emphasis on plant sanitation. At the same time scientists advocated it and well-managed concerns soon became famous for their cleanliness. Indeed they promoted public inspection tours to display their new pride. Most unprofitable companies have been slipshod in their housekeeping.

Architects plan for factory cleanliness, and the makers of building materials develop some of their products with the same purpose in mind. Improved equipment and materials have produced high cleaning efficiency and better methods in use. As knowledge of these improvements has spread, a public demand for better plant sanitation everywhere has arisen.

Industrial sanitation must attend to more than the plant and its equipment. Workers must be protected from one another. The proximity of workers in mass production makes personal cleanliness a necessity. To assure the good health which is essential for maintaining work schedules and increasing productivity, workers with colds and other contagious diseases must not be allowed to infect their fellow workers. It goes without saying that the utmost cleanliness is required of all cafeteria personnel; an infected scratch on a cook's finger can send a whole plant home sick.

---

[7] From Edmund F. Richardson, "Better Vision for Greater Efficiency," *Factory Management and Maintenance,* Vol. 105 (September 1947), p. 109.

It was the lack of sanitation that caused De Lessep's failure to build the Panama Canal, and it was the sanitation program of General Gorgas that made possible our success a few years later. Business has learned the value of personal mass sanitation chiefly from army experiences. Our army had more casualties from germs in Cuba in 1898 than from Spanish bullets. Napoleon's victory at Moscow was turned into defeat by the typhus germ.

Plant sanitation expense is about 95 per cent labor and 5 per cent materials. A consistently followed program has been estimated to increase the work output from 10 to 20 per cent.[8] Industry will improve plant and personal sanitation just as fast as it becomes clear that they produce direct savings. Evidence of savings is accumulating fast, especially among the large and more profitable companies.

2. *Vacations* with pay are directly beneficial to health. During World War II it became common practice for employees to request and obtain the privilege of working through their vacation periods in order to obtain the resulting double pay. There is no doubt that both the company and the workers lost by this arrangement. After the war some workers insisted on continuance of the double-pay practice when the demand did not warrant it. Company officers who gladly went along with the no-vacation policy during the war had difficulty in convincing some employees that the real purpose of a vacation was change from their daily tasks.

3. Much of the repetitive work of modern industry builds a nervous tension which results in a special kind of unhealthy fatigue. To what extent *rest periods* can bring relief has long been the subject for extensive experiments.[9] It will be remembered from Chapter 4 that in his search for the law governing exhaustion in heavy labor, Taylor found that forcing the worker to take specified rest periods actually increased his productivity. The lesson of all subsequent research in this area is that for any kind of work, physical, mental or a combination of both, over-all productivity is increased if the worker is allowed to rest before he tires himself out by working too long at one stretch. The practical problem for an industrial health program is to work out the optimum number, length and spacing of rest periods.

---

[8] The Garson-Stewart Corporation of Cleveland, Ohio, specializes in plant sanitation for industry. Their findings about the relation between costs and savings in the field are interesting and apparently factual.

[9] For an up-to-date discussion of the state of research in this area, see Norman R. F. Maier, *Psychology in Industry* (2d ed.; Boston: Houghton Mifflin Company, 1955), Chapters 15 and 16.

It has been found that if workers are left entirely to themselves, they are quite likely not to apportion their own rest periods wisely. Some workers who are highly motivated on the job will work very energetically and without pause for several hours and tire themselves out so completely that they are practically useless toward the end of each day. A different sort of problem arises in organizations where no rest periods are provided for, when workers tire themselves out — psychologically, if not physically — by sneaking off the job in a self-defeating effort to relax.

Unfortunately there is no simple solution to the problem of proper rest periods. Some people need more rest than others, but especially in assembly-line work, it is not possible to adjust rest periods to the individual. The industrial health program must determine what is the best compromise plan for the situation in its own organization. The important point is that some rest-period plan be officially installed and adhered to. The most common plan being followed today is that of a fifteen-minute rest period in the middle of the morning, and another of the same length in the middle of the afternoon.

4. The *atmosphere* of the work place is also receiving more attention. The techniques of "controlled atmosphere" now extend to regulation of temperature and humidity and the elimination of fumes and detrimental germ and dust particles from the air. Automatic control of temperature is not new, even in industrial plants, but humidifying and cleansing of the atmosphere are still somewhat novel. In most plants the aim is to improve production and lower costs through the improved health and comfort of the workers. In some processes, such as lens grinding and artificial-yarn "spinning," atmospheric control is also beneficial to the product.[10] Technical management magazines contain numerous advertisements of companies specializing in equipment for controlling the atmosphere. The growing effectiveness and declining cost of such equipment has led to windowless buildings where atmospheric controls can operate more accurately and at lower costs.[11]

5. *Noise, light* and *color* are all factors to be considered in a health program. We have long recognized the bad effects of many industrial noises. The medical profession has now demonstrated that shrill notes make us nervous and low notes upset our digestive organs. And yet until recently we have done little about the problem of noise except to send its victims to already congested hospitals. The English have been quicker than we to attack the problem closer to the source and give full-scale attention to taming industrial noise. One English writer, setting up the noise unit as a

---

[10] The Gotham Hosiery Company claims that air-conditioning has made possible appreciable savings in nylon hosiery manufacture. In 1947 Gotham contracted for the largest air-conditioning installation in the industry. It is claimed that abnormal temperatures and humidity cause the yarn to gum or kink when used on the finer-gauge machines.

[11] The technical production advantages of controlled atmosphere are considered further in Chapter 12, page 227.

"phon," has decided that 130 of these phons constitute the limit of human endurance without discomfort.[12]

Noise is being reduced in American industry, partly because management is coming to see the hidden costs in uncontrolled noise, and partly because unions are demanding correctives. The unnerving effects on the worker are indisputable. Noise increases absences, production costs and labor turnover. There are two fundamental ways to combat these industrial noises: one is to eliminate them at the source, and the other is to absorb them with specially designed acoustical equipment. Finally, it is now realized that many factory noises result from unnecessary machine vibrations which can be remedied at far less expense than the physical and nervous damage to the workers.[13]

The related factors of light and color may be made injurious or beneficial for the health of the employee. They are discussed in Chapter 21.

6. *Music* can be an indirect aid or hindrance to worker health. Some of it might well be included under "noise." More and more plants are experimenting with music. Some are dropping the idea after a short unplanned program. To be healthful, music, like medicine, must be prescribed in kind for the purpose, and in doses suited to the patient. Industrial music fails unless it is planned. Screaming jazz in the cafeteria will cause more harm than good. A small, highly skilled group of Germans preferred opera to jazz, and waltzes to either. If music is to aid directly in the production and assembly processes, the rhythm of the music should bear a close relation to the natural rhythm of the work. Within the recent experience of the author, labor relations and production were observed at their optimum among a large group of skilled core-makers while they were mass-singing at their benches. The singing was purely spontaneous. If this natural inclination had been reinforced occasionally by loud-speaker music, these outbursts of rhythmic work would have been more frequent and more extended, with beneficial effects on production. The right tune, at the right time and in the right tempo, makes the most of the worker's latent propensity for music and rhythm.

7. *Records* which point to health troubles and their causes are absolutely necessary for maintaining a healthy group of industrial workers. Remedies for individuals and groups should be based on the known causes of their problems. Preventive programs must have a broad base of empirical data. Among the causes of industrial absenteeism, illness ranks first. It seems reasonable to predict that with the future development of direct and indirect health aids, business can cut absences in half, while increasing productivity at a fraction of the cost of our present remedial approach to the worker's health.

---

[12] The problem of noise has possible legal consequences. Two state courts have held that "noise deafness" is a compensable injury.

[13] A scientific treatment of noises, their effects and corrections, appears in *Factory Management and Maintenance,* Volume 111 (December 1953), pp. 113–136.

Industrial Safety

From the handicraft era, through the Industrial Revolution, to the present development of mass production, industry has paid an ever increasing toll in dollars and human suffering for preventable accidents. In recent years, owing to scientific analysis and consequent correctives, the accident curve has taken a decided dip.

Three cycles of accident philosophy

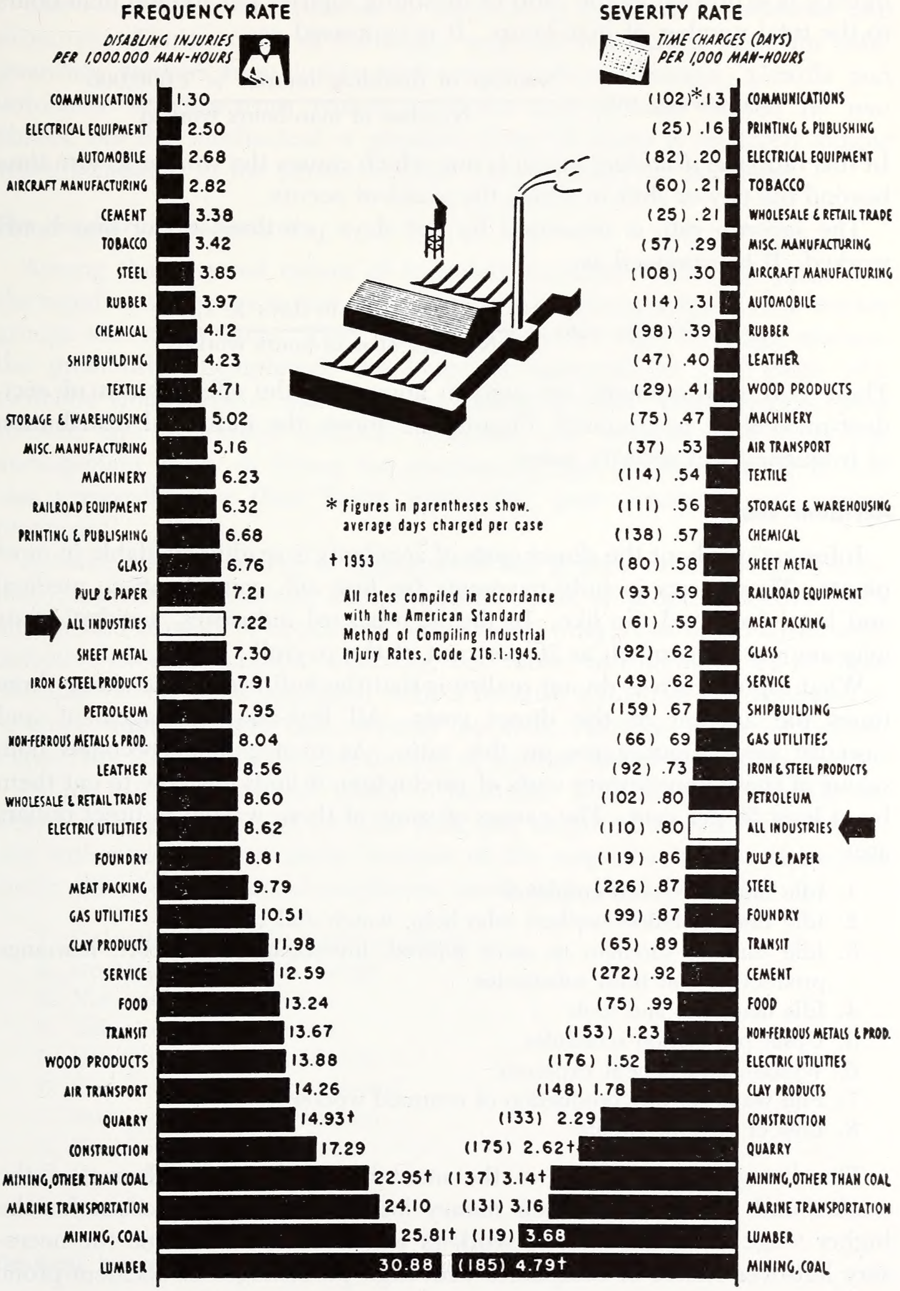
The philosophy regarding industrial accidents appears to have gone through three broad historical cycles. The first was the *legal* phase, during which the employer cared little for his employees as a group, and defended his lack of interest behind legal barriers. The common law allowed, and the courts supported, the employer's escape from liability for injuries to his employees by any of three technicalities. *Contributory negligence* defeated the worker's claim by showing that the accident was caused, in part at least, by his own negligence. The *fellow-servant rule* exempted the employer from liability on the theory that some fellow worker's carelessness had contributed to the accident. And the *assumed risk doctrine* upheld the worker's assumption of risk by accepting the employment offered, and so relieved the employer from payment of damages caused by accidents.

The second phase might be referred to as the *social* or *humanitarian.* Public demand, union insistence and increasing employer social interest did away with the legal hedges to liability for accident damages, and substituted statutory provisions for workmen's compensation irrespective of the cause of the accident. The first period blended into the second. Employers' liability laws were passed in Alabama and Massachusetts about 1885. These statutes made it more difficult for the employer to escape the payment of damages. Then came the workmen's compensation laws, the natural sequence of the growing sense of employer obligations. Maryland passed the first of these laws in 1902. As the movement spread, its general implication was that the liability for accidents was with business, which should pay into state funds on a payroll basis so that all workers could be compensated if the injury resulted from their employment. The theory and practice of this second period was generally accepted by all concerned long before Mississippi fell in at the tail-end of the workmen's compensation parade in 1948.

The third phase might be called the *scientific.* It ceases to emphasize liability, which it accepts without question, and gives attention to the preventive phases of accidents. Most large companies are already operating on this philosophy of safety, on the assumption that it pays both socially and financially. The present attitude of progressive management toward safety is simply an adaption of the methods of scientific management to the accident field.

FIGURE 23.2

Injury Rates for 1954



* Figures in parentheses show average days charged per case

† 1953

All rates compiled in accordance with the American Standard Method of Compiling Industrial Injury Rates. Code Z16.1-1945.

Courtesy: National Safety Council

Accident measurements

Accidents are measured by frequency and severity. The measure of *frequency* is expressed as the ratio of disabling injuries per million man-hours to the total number of man-hours. It is expressed as:

$$\text{Frequency rate} = \frac{\text{Number of disabling injuries} \times 1{,}000{,}000}{\text{Number of man-hours worked}}$$

In this ratio the *disabling injury* is one which causes the worker to lose time beyond the day or shift in which the accident occurs.

The *severity* rate is measured by lost days per thousand of man-hours worked. It is expressed as:

$$\text{Severity rate} = \frac{\text{Total lost time in days} \times 1{,}000}{\text{Number of man-hours worked}}$$

These two measurements are used in appraising the effectiveness of accident-prevention programs.[14] Figure 23.2 shows the industrial distribution of frequency and severity rates.

Accident costs

Information about the *direct costs* of accidents is readily available in most plants. These costs include payments for first aid, compensation, medical and legal fees, and the like. In the high-hazard industries, accident costs may amount to as much as 20 per cent of the payroll.

What top executives do not realize is that the *indirect* costs average three times the amount of the direct costs. All first-class management and casualty associations agree on this ratio. As management becomes conscious of these unnecessary costs of production, it finds out how to cut them by at least 50 per cent. The causes of some of these wasted indirect dollars are:

1. Idle time of injured employee
2. Idle time of fellow-workers who help, watch and talk
3. Idle time of foreman to assist injured, investigate and report, rearrange production and train substitutes
4. Idle machines and tools
5. Upset production schedules
6. Welfare and benefit expenses
7. Full wage for low production of returned worker
8. Loss of possible profits

This list gives no picture of the mental and physical suffering of the worker and his family, or their money losses; nor does it account for the higher wage rates and inferior workers who eventually become the necessary left-over choice of companies with high percentages of accident-prone employees. Concern over industrial accident rates has become serious enough to support more than twenty organized safety services on a national scale.

---

[14] The bases for frequency and severity rates are from the *American Standards Association Code for Compiling Injury Rates.*

The two fundamental reasons for minimizing accidents are *humane* and *economic*. The function of the safety engineer becomes a quest for safeguarding workers from injury, and property from damage. Guards and automatic machine-stops reduce accidents and damage caused by machines, but this mechanical or physical phase of safety is relatively simple when compared to the personal causes and remedies for accidents.

The worker as a hazard

Among the *personal* causes of industrial accidents in recent years was the rapid mass change to war production, which brought many new worker groups into most plants. They included the under- and over-age, women, the previously unemployed, the long-time unemployed, and those who switched from clerical and other non-industrial jobs. These groups often showed lack of ability, aptitude, attention and interest. Not only was management guilty of hiring the emotionally and physically unfit, it was also responsible for their faulty instruction, poor discipline and unsafe practices.

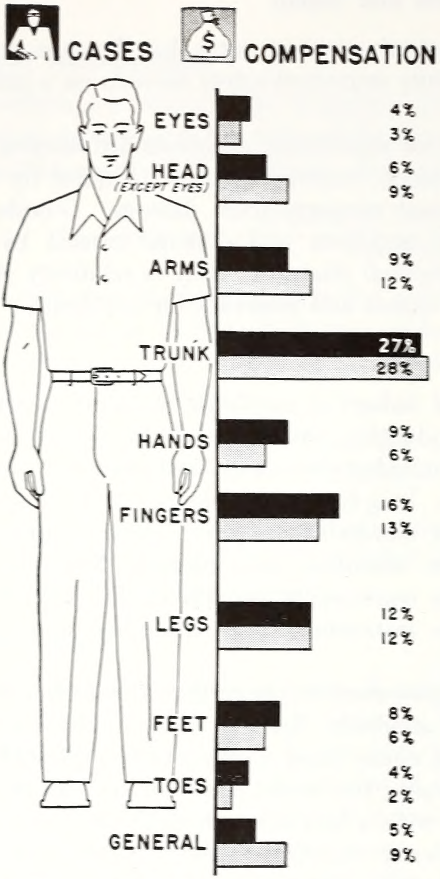
In some cases, insecurity of employment and general exhibitionism (horseplay) contribute confusion and accidents. Lack of proper selective techniques, and scarcity of applicants, cause many workers to be admitted with defective eyesight, organic weakness, bad teeth, and hernias. All of these personal factors have combined with a feverish industrial development to produce high intensity and severity accident rates in many industries. Figure No. 23.3 shows the distribution of injuries to the human body.

People are the "unsafest" factor in business. They may be properly selected, adequately trained for their jobs, and taught to work and act safely, but with discouraging results because of the unpredictable psychological factor. Most unsafe acts of employees result from the following:

1. Operating at unsafe machine speeds
2. Operating without authority
3. Not using safety devices
4. Using unsafe equipment
5. Using hand in place of tools
6. Unsafe loading or transferring
7. Fixing equipment in motion
8. Unsafe position or posture
9. Horse-play and teasing
10. Unsafe work clothes

Physical hazards

Physical hazards go far beyond defective machines. Poor housekeeping, for example, is a far greater contributor to injuries than the records show.



● Source: Reports of 8 state labor depts., mostly 1951

FIGURE 23.3

Distribution of Injuries to the Human Body

Reprinted from "Accident Facts," 1953, with permission of the National Safety Council

Some of the poor physical factors are unsafe buildings, poor working conditions, poor work planning, unfit work clothes and improper heating, lighting and ventilation. Incidentally, all of these mechanical defects add to production costs, even in the absence of accidents.

On the physical or mechanical side of the safety program we may expect accidents and injuries to result from:

Defective machines
Unsafe machine design
Poor machine construction
Lack of machine guards
Inadequate machine guards
Aisle and storage hazards
Lack of safety equipment
Poor plant layout
Improper illumination
Improper ventilation
Improper temperatures
Inadequate exits
Overloading of machines

There are many positive physical safety factors which industry can adopt, if only from the standpoint of profitable production. Scientific planning of inside color painting is an outstanding example. Because freedom from tension and fatigue reduces the likelihood of accidents, such facilities as comfortable rest rooms, adequate equipment and suitable work music must also be classifed as safety promoters.

Reducing accidents

Accidents and injuries can be reduced in any plant. Those with good accident records are continually improving them. Those with the best production and profit records also have the best safety records. Marginal producers pay little or no attention to scientific accident prevention, which is one of the reasons why they are marginal producers. All research studies by management and engineering societies agree that:

1. There is a positive correlation between safety and production.
2. Material reductions in accident rates are obtained simultaneously with increased production rates.
3. Safety surveys and installations can be made without interfering with production.
4. Maximum productivity is achieved only when accidents are at an irreducible minimum.
5. The incidental costs of accidents are three times as high as the direct or recorded costs.

How can accidents and injuries be reduced? Obviously, realistic improvements must be based on factual analysis. The scientific approach, which isolates the problem, gets the facts, analyzes them, synthesizes them into a plan, installs the plan and finally tests and improves it in practice, applies to a safety problem as well as to other management activities.

Accidents result from unsafe acts of persons and various physical hazards. To compile past accident records, with causes, is the first step toward safety. Behind the apparent reasons there may be managerial or supervisory causes. Given the compiled historical background of accidents, the analyst must depend on his training, experience and judgment to work out the answers.

Worker problems are more numerous, less tangible, and therefore more difficult to study and correct than the physical and mechanical problems of safety. There is apparently a certain elation in the prospect of "dangerous living." The person–injury sequence has been established as (a) social environment, (b) fault of person, (c) unsafe act or mechanical hazard, (d) accident and (e) injury. Whenever *c* (unsafe act or mechanical hazard) can be eliminated, then *d* and *e* are naturally out. It is obvious, therefore, that the attack must be directed against *a* and *b*. How can we successfully defeat *a* and *b* in industry? The basic suggestions include:

1. Proper selection of new employees
2. Job analysis that fits the worker to the job
3. Adequate job training
4. Planning, preaching, and acting safety

Safety must be a daily practice, not a campaign. Employee committees can be made the core of safe practices, but they must have trained guidance.

One example of the successful use of an employee committee had to do with smoking as a fire hazard. The group of workers involved were asked to elect a committee which would develop the proper safety rules and then police them. The safety director coached the group on the hazards involved and the possible means of circumventing them. Their interest was indicated by their questions and the regulations which they worked out. The success of this approach proved itself in the general acceptance of the new smoking rules in that department.

Educational Devices. The work of the safety committee can be materially aided by films, meetings, safety dances and picnics, posters and safety suggestion boxes. Lectures on company time to groups of workers is another effective method of safety education. Films used in connection with this phase of the work should depict the causes and results of safety hazards, both personal and mechanical. They should also point out how the causes could have been removed and the accidents prevented.

There are also basic safety incentives such as self-preservation, personal and material gain, loyalty, responsibility, pride, and conformity with the better group habits. All of these motives can be appealed to, and it is considered good practice to give some form of recognition for creditable results.

Cost of health and safety programs

A 1951 survey of 1576 companies with 1,464,472 employees, lists expenditures of about 38 million dollars for health, medical and safety programs. This amounts to $25.90 spent for each employee annually for these services.[15] As the survey suggests, this figure is probably low because of the lack of uniformity in reporting, and because some concerns had no cost records other than direct expenditures. Irrespective of the amount that should be expended per capita for these services, the significant threefold increase over the per capita expenditures of $8.81, reported by the same surveyor in 1940, shows quite definitely the new emphasis that industry is placing on the health and safety of its employees.

The range of per capita annual expenditure for health and safety services among the 1576 companies reporting ran from a low of $15.67 to a high of $45.39. The low figure did not necessarily indicate a lack of interest since it came from among the group of companies employing over five thousand, with a consequent wide spread of costs. The highest per capita costs, on the other hand, came from companies employing fewer than 250, with a narrow cost spread.[16]

---

[15] See *Health Service in Industry* (Washington, D.C.: The Brookings Institution, 1952), which contains a 1951 survey of the National Association of Manufacturers and a 1950 survey made by the American College of Surgeons.

[16] Industry's new slant on health and safety is well developed in an article by Daniel C. Braun, "The Importance of Industrial Medical Departments as a Management Tool," *Advanced Management*, Vol. 18 (October 1953), pp. 13–16.

Conclusions

Business and industry have come to recognize a definite relation between the health and safety of workers and their productive efficiency. The statistics have also established a relation between health and accident records. With these facts at hand, the programs of the specialists are emphasizing the preventive phase of health and safety. There is already a dependable measure of the results of preventive programs in the decreased rates of occupational diseases and industrial injuries. Additional measures can be found in lower compensation premiums.

The National Association of Manufacturers' 1951 survey indicates definite beneficial effects of health and safety programs on absenteeism and labor turnover. It is obvious that improvements in these two categories would have a good effect on employer–employee relations.

Preventive measures start with the pre-employment physical examination, in which many physical defects are discovered, some of which should be remedied before the worker is assigned to a job. The examination should also be used to place the worker on a job that is fitted to his physical condition. Periodic re-examinations are beneficial for all employees, but especially for those who showed physical deficiencies in the original examination. The personal nature of health and safety programs requires educational stimulants for lasting effects. That the worker should understand the reasons for health instructions and suggestions is just as much a prerequisite for a successful program as his willingness to cooperate.

Small concerns cannot carry on adequate programs on an in-plant basis. However, there is a growing group of professional health and accident services available on a call or contract plan, at rates favorable to a company while it is growing into an in-plant program. It is obvious that management not only recognizes the financial value of health and safety services, but has also developed a spirit which promises an increasing interest in their future progress.

QUESTIONS

1. What is the relation between health and safety?
2. What purpose should the industrial physician have in mind in connection with the physical examination prior to employment?
3. Criticize the recommendations of the National Association of Manufacturers' essentials for a good health and safety program.
4. Do you think that the Jack & Heinz Company went too far in its health program? If so, what items would you eliminate, and why?
5. If you were a physician, would you object to modern business' development of the employee health program, and why? What policy changes would you suggest? Do you think that the present program tends to decrease the income of private physicians or add to it?

6. Would you favor in-plant lunches at company expense? How, in your opinion, might such a plan add to productivity, and what details should be considered for furthering such a purpose?
7. What policy would you adopt in hiring workers with hernias, and why?
8. Assuming that there is a relation between defective vision and accidents, what plan would you suggest to minimize the frequency and severity rates resulting from this cause?
9. What is the recognized relation between plant sanitation and work output? How does the expense of maintaining sanitary conditions compare with the gain in output?
10. What are some of the problems that arise in trying to establish proper rest periods?
11. It is occasionally contended that the continuation of even loud and shrill industrial noises accustoms the worker to the situation so that he experiences no discomfort or ill effects. Comment on this contention.
12. How would you adjust music to various worker situations?
13. What are the three phases or cycles of accident philosophy?
14. Which is more expensive to business in the accident field — frequency or severity of accidents? Which industry has the highest combination of frequency and severity rates?
15. What is the relation between direct and indirect accident costs?
16. What is meant by the statement that "people are the 'unsafest' factor in industry"?
17. How can accidents be reduced?
18. How much should a good health and safety program cost per employee?
19. If you operated a small concern, and could not afford the essentials of a good safety program, how would you deal with the situation?
20. What part of the worker's body suffers the most accidents?

CASE PROBLEM

The Custom Packing Company

The Custom Packing Company has an accident frequency rate of 14.50, which is 4.71 higher than the average for its industry, and 7.28 higher than the national industrial average, as both rates appear in Figure 23.2 of the National Safety Council. The company's severity rate has been determined, on the basis of last year's figures, as about .62, which is only .03 higher than the rate for the meat-packing industry, and .18 lower than the national average severity rate.

Mr. Wilson, president of the company, has been concerned for some time about its "accidents," which he recognizes only by their number on a monthly basis, and their effect on the concern's compensation rates. He has been discussing the accident situation with his engineering department each month as the figures are available. Although he is not conversant with the technical details of accident and safety programs, he has come to the conclusion that engineering is responsible for the upward trend in the frequency rate and the rising costs for all activities connected with the medical department and first aid.

In its defense, the engineering department has reported that all mechanical hazards have been cared for and all guards are in place. The chief of engineering confesses that he is not skilled in safety work, and suggests that Mr. Wilson have a survey made by some consultant conversant with the problems of safety and their correction, so that a scientific program for improvement may be worked out.

Mr. Wilson objects to the survey suggestion because he feels that it will interfere with production, and that any possible savings in the medical department's expense will not justify the cost of the survey and its results.

The Custom Packing Company has been in operation for twenty-five years, has a modern plant and about twenty-five hundred employees. Since most of its operations are performed by semiautomatic machines, its labor force is about 20 per cent semiskilled and 75 per cent unskilled. It is the latter group that has been accounting for most of the high frequency rate.

PROBLEM. If you called on Mr. Wilson to sell him on your safety survey plan, how would you answer his objections, explain the unreliability of his accident costs, and convince him, from the accident rates quoted, that his difficulty may stem from something other than mechanical causes? What do you think is the main reason for Custom's poor safety record, and how would you go about correcting it?

CHAPTER 24

Wage Factors in Labor Relations

●

Although numerous surveys have shown that wages do not hold top place in the worker's evaluation of his job, such a finding almost challenges belief when it is realized that the rate of wages, in some form or other, is the chief topic for discussion in most labor–management contract negotiations. Wages are fundamental in the worker's thinking in relation to his family's living standards, and they are the measure of his personal importance in relation to his fellow workers. Some sort of reward for personal service is the normal motivation to productivity for the great majority. It is true that working conditions and job security are very important, but many workers have improved job security in recent years by their increasing mobility. The Industrial Revolution stripped the individual worker of most tangible controls over his wage, and he joined organized labor groups primarily to overcome this disability.

Wage principles

There are several fundamental wage principles which play an important role in fixing the general level of wages. The application of some of these principles is still controversial from both the management and labor points of view.

Cost of living. The reason most frequently given by labor for a rise in wages is a rise in the cost of living. During periods of rising prices, labor reminds management of the cost-of-living principle. On the other hand, when prices are falling, labor is equally vociferous in demanding that management hold the line in wages.

In actual practice, labor and management have agreed to tie wage changes to the cost of living only during periods of rising prices. Labor agrees for the simple reason that the plan promises higher pay during a foreseeable period. Management agrees because it is interested in some tangible stabilizing formula, and the cost-of-living index promises surcease from the pressure of wage negotiations.

The Philadelphia Electric Company's "Market Basket" plan worked successfully for several years, but was repudiated by labor during the depression of the thirties. The most widely used measure of the cost of living today is the "Consumer's Price Index for Moderate-Income Families in Large Cities," issued by the U. S. Bureau of Labor Statistics, which measures changes in the average retail prices of food, clothing, rent, services, house furnishings and miscellaneous items. If wages were always to be geared to such a measure of the cost of living, living standards would tend to become frozen. Therefore, the cost-of-living principle is desirable for the long run only when it includes some fixed annual increase to provide for improving living standards, irrespective of changes in the index. General Motors' five-year agreement with the United Auto Workers (CIO) was the first outstanding example of a cost-of-living contract with provision for a fixed annual increment.

Ability to Pay. Basing wages on the company's ability to pay is advanced by both labor and management when it suits their individual interests. Sometimes the corporation profit-and-loss statement provides labor with a basis for urging a wage increase; at other times it gives management an argument in favor of decreasing wages or maintaining the status quo. As a principle, the idea seldom serves the purpose of the individual company. Union leaders occasionally suggest that a change in management might have a salutary effect on the complaining company's operating deficit. The conclusion is that periodic profits or losses of an individual company have little or no effect on general wage levels. If, however, general business conditions are pointing upward or downward, neither labor nor management can escape their consequences as reflected in the wage scale. Ability to pay has little effect on wage levels for the short run; but in the long run it inevitably influences wages.

Contribution to Production. The contribution to production by the worker is an almost unassailable principle for fixing wages, but it is impossible to apply in practice. The economic theory that land, labor and capital are the factors of production is perfectly valid, but any practical method for separating the contributions of the three has not yet been discovered. Even if it were possible to segregate labor's contribution, endless controversy would arise over division of the "spoils" among the various labor groups and skills.

Productivity. Productivity would furnish an excellent criterion for the determination of the general wage level if an acceptable standard of production could be agreed on. Even in such an inconceivable situation, organized labor's objection would be based on its philosophy of the equality of workers within given work classifications. However, production standards have led to the use of measures of productivity as partial wage determinants within a limited field. Such measures can be the basis of incentive plans and piece-work rates — when organized labor accepts both the principle and the production standard.

Wage Fund. The wage-fund theory of the classical economists is akin to the belief that labor's contribution to the production process can be isolated. When it can, then labor's total share, or wage fund, has been established. The problem then arises of determining a fair split among the workers involved.

The Market Theory. The market theory of wage determination, based on the relation between the supply and demand of labor, is the most potent factor in fixing the general level of wages. This principle is also referred to as the commodity theory of wages. It likens wage determinations to the supply and demand forces that fix the market prices for commodities. It is particularly distasteful to organized labor for obvious reasons. Although the unions have done well in preserving their official wage rates during depressions, there usually develops an unofficial lower rate, often suggested by those union workers who are unable to find jobs at the official scale.

Wage policies

Every business organization claiming to be fairly managed should have definitely established and communicated wage policies. It is only through a declaration of policies that employees can have confidence in their employer. Company policies with respect to wages may be expressed generally, or they may be broken down into details. If the policy statements are kept general, personnel management is given greater flexibility; on the other hand, the more detailed announcements promote worker confidence and morale. The following descriptive titles emphasize the factors which should be included in an acceptable statement of wage policies.

1. Working periods that result in healthful fatigue
2. Extra wages for overtime and night shifts
3. Wage differentials for skill, experience, responsibility and working conditions
4. Recognition of individual merit
5. Fair standards of performance
6. Promotion from within
7. Payments for vacation and sick leave

It is sometimes suggested that announcements regarding wage practices, and provision for prompt attention to wage complaints, be included in wage policies.

Administrative Problems

Wage levels

The belief that wage increases always cause price rises is quite common, even among producers. It is on this assumption that a considerable section of management cries "inflation" whenever there is a general rise in the wage level. Rising prices are caused by increasing production costs or increasing consumer demand. But increased production costs do not necessarily follow increases in wages, either in the individual plant or in industry as a whole.

In the individual plant, wage increases may be offset by increased productivity (production per man-hour), by decreased costs of raw materials or by increased production. Increase in man-hour production does not necessarily mean that the workers have speeded up. On the contrary, it usually means that there has been a larger investment in machinery per worker. It may mean that methods have been improved. Increased productivity lowers unit overhead costs, and increased production leaves a wider margin for profits above the break-even point. Decreased material costs, other factors being equal, lower total production costs. If there is no change in the three factors mentioned above (productivity, material costs and volume of production), then the cost of production is certainly raised by a wage increase, and the company will suffer diminution of profits or a loss, unless buyer demand permits an increase in prices.

Even during the depression (1929–1933) worker productivity rose 25 per cent in many industries, and more in some. During World War II, productivity standards were mixed. While they rose generally in the war industries because of government pressure and incentive wages, they fell in civilian production. During the period 1921 to 1938, average hourly earnings rose approximately 30 per cent, while productivity increased about 60 per cent. Under such conditions, wage costs per unit of output naturally fell. Between 1933 and 1937, wages rose between 40 and 50 per cent in one large farm-implement concern. But because sales increased by more than 600 per cent during the same period, unit overhead and unit selling costs more than wiped out any increase in production costs due to wage increases.[1]

When there is a general wage increase of about the same percentage in all industry, costs of production will rise and so will prices, unless there is a counteracting change in productivity, cost of raw materials or production volume. The price rise will, in most cases, be the difference between the new wage increase and the resulting levels of these three factors. If a considerable portion of the working population is left out of the general wage increase, their lack of purchasing power will leave a larger pool of commodities for those groups which participated in the wage boost.

Because of the controlling economic factors which determine the relations between wages and prices, it must be clear that the purchasing power of the average worker is improved by general wage increases only when the resulting percentage of productivity increase tops the percentage of the wage boost. For the erroneous ideas respecting the relations among wages, prices and purchasing power, both labor and management are equally

---

[1] Lloyd G. Reynolds, "Problems in the Administration of Wages," an address before the Pittsburgh Chapter of the Society for the Advancement of Management, December 13, 1945. Published in *Advanced Management,* Vol. 11 (March 1946), pp. 2–8.

culpable. Labor preaches and advertises that national prosperity will surely follow wage increases due to the resulting rise in the purchasing power of the worker. Unless some compensating influence results, in the form of greater productivity, lower raw-material prices or a larger volume of production, "prosperity" will flow only to that small segment of the workers who participate in the wage increase. Other groups will pay the bill in the increased prices for the commodities made by those whose higher wages boosted their costs. Equally fallacious is the contention that wage increases cause higher prices while the purchasing power remains the same. Both labor and management oversimplify the situation and confuse the consumers.

"Fact-finding"

Early in 1946 the President asked Congress to grant him authority to appoint "fact-finding boards" to deal with important national labor disputes. The requested legislation empowered boards to find the facts and make recommendations based on them. Presumably the function of these boards was to recommend a wage change that would establish a proper relationship among wages, prices and purchasing power.

Without waiting for enabling legislation, the President appointed fact-finding boards to deal with wage disputes in the automobile and oil industries. During twenty years following the enactment of the Railway Labor Act of 1926, there were thirty-one presidentially appointed emergency boards to handle wage disputes in the railroad business. The pacifying results of these boards' studies are often cited as ample justification for "fact-finding" in wage disputes. What are the facts?

One fact not generally remembered is that the wage recommendations of two railway Emergency Boards were revised upward by the President. The first was in 1941, when the railway unions refused to accept the Board's wage recommendation, and threatened to strike. The second came right after the government seized the railroads to prevent a national tie-up. Thus, in at least two major cases in railroad fact-finding, the facts were pushed aside when they ran counter to the administration's labor policies. In the major steel and rail wage disputes of 1945–1946, fact-finding was abandoned in favor of negotiation by the Reconversion and Stabilization Board.

Fact-finding is the readily admitted scientific approach to any problem. However, when there is a lack of any principle to which the facts can be related for a solution, then their accumulation, even assuming that they are true and pertinent to the subject, is useless for the intended purpose. The situation is still worse when, in the absence of an objective principle, political policies are made the basis for applying — or ignoring — determined facts. These two factors, lack of accepted principles and the injection of political policies, create such a wide gap between the form and the substance of a solution to the problem that expediency steps in where objectivity fears to tread.

The guaranteed annual wage

Annual wage plans guarantee the employee, with varied restrictions, take-home pay at a more or less constant rate. The purpose is to smooth out, from the wage standpoint, production peaks and valleys caused by irregularity of sales. There are several important matters that affect wage stabilization in any company. How long shall the guarantee period last? To whom shall the guarantees apply? What shall be the amount of the guarantee? What part of the financial loss resulting from the guarantee shall be absorbed by the company and by the workers?

Because of the ever present danger of a downswing in the general business cycle, most companies restrict the guarantee period to one year, some for a shorter period. Otherwise, the possibility of financial ruin lurks in company commitments for guaranteed wage payments.

Another restriction relates to the selection of workers who shall be covered by the plan. Most companies start coverage after one year of employment; some use a shorter or longer period. Under some plans the company sets up coverage limits for different job classifications after determining its total labor needs for the ensuing year. Within the classifications, guarantees are applied on a seniority basis, making it possible for the company to retain its more valuable employees during the periods of reduced production.

The amount of the guarantee is more of a problem than its duration or the extent of personnel coverage. For this reason guarantees differ widely in terms of company liability and the amounts of payment. The common practice is to establish a basic work-week and a basic pay check. If the work-week figures lower pay than the guarantee, the company pays the difference, which must be made up by the employee when longer hours or overtime permit. The basic pay may be calculated on the forty-hour week, or less.

The worker is obligated to reimburse the wage fund on a monthly, quarterly or annual basis. The end of the guarantee period closes the worker's obligation to the company. Annual balancing of the account is, of course, more advantageous to the company. Another restriction is the financial limit to the company's guarantee, which may be fixed on the number of hours or dollars. The details of typical company wage stabilization plans are discussed in the following chapter on Wage Plans.[2]

Title III of the federal Social Security Act also aids in stabilizing wages during the first twenty-six weeks of a recession. The unemployment compensation feature of the Act is carried out through those states which have approved legislation and the machinery for its operation. However, the restrictions are so numerous and the payments so small that the benefits provided can scarcely be referred to as wage stabilization.

---

[2] For the employers' point of view, refer to "The Economics of the Guaranteed Wage," Report of the Committee on Economic Policy of the U. S. Chamber of Commerce, a twenty-five page pamphlet, published in 1948. See also: "Job guarantees — Labor's next goal," *Modern Industry*, Vol. 19 (June 15, 1950), pp. 44–46.

Successful wage stabilization in industry, or any other type of business, must be predicated on leveling of sales, which in industry leads to leveling of production. The problem starts with sales in any case. Actually, buyers must be educated to order the year around instead of seasonally, or producers must be prepared financially and through storage facilities to pile up finished products during dull seasons. Wage stabilization will not be successful on any large scale until the disruptive effects of business cycles can be brought under control.

Job stabilization

Unstabilized jobs, like unstabilized wages, result chiefly from seasonal and cyclical fluctuations. By and large, the two problems must be handled in the same way. Stabilization of jobs depends on accurate personnel manning tables, which are impossible unless production can be based on sales which are accurately estimated and spread evenly through the year. Job stabilization is the basis of wage stabilization. Both are extremely important to workers and employers.

Individual companies can help themselves and their workers by scientific planning, operating and controlling of sales and production and personnel procedures, in the order mentioned. But individual or spasmodic company success will not make a dent on the national problem of unstabilized production. Intercompany cooperation along the lines suggested will represent a forward step. Government assistance and regulation, in spite of their unwieldiness, will be necessary for any large improvement on a national scale. Only through that agency can we hope for the far-flung coordination of effort necessary to solve this problem.

Fringe benefits

"Fringe wages" are often referred to as the *invisible pay envelope.* They include such items as paid vacations, holidays and sick leave, call-in pay, severance and portal-to-portal pay, night-shift differentials, health and life insurance benefits and welfare payments of various kinds, including so-called royalties. It is not necessary to discuss most of these at great length, because the purposes of most of these fringe benefits are well known. A few of them must be looked at more carefully. Even management, which pays these hidden wage bills as agents for the consumers, knows too little about some of them in particular, and still less about them as a group.

Vacations are necessary for maintaining or improving health. Nonworking holidays may also be beneficial, depending on their use. Neither could be enjoyed by the average worker unless his wages were continued. Some observers contend that holidays have started to get out of hand, as organized labor has succeeded in adding another about every five years.

The privilege of *sick leave* is frequently abused and often the workers taking advantage of it are not sick at all. Many women workers appear to have a feeling that their efficiency might be questioned if they used less than their total sick-leave allowance. *Call-in* pay can scarcely be questioned, even though its designation is a misnomer. If a worker reports for duty in natural course, he should receive some reimbursement when no work is available. *Severance* pay usually refers to money due to the quitting worker who has made contributions to pension and other funds. He has a form of vested right in the fund. However, there is another form of vested right which refers to the employee's privilege of working for a particular concern, a right which has a compensable value if he is forced to leave through no cause of his own, such as technological changes in production. If the employer is held liable for damages to his employees for loss of jobs due to technological change, the burden may become so heavy during a period of fundamental machine improvements that the damages can scarcely be paid except from public revenues, as a social obligation.

The *night-shift* differential is not so easy to justify. In the first place, it is a war baby, and in the second, there are many workers who prefer the "dog watch" to any other and complain strenuously when shifted to daylight hours. Experience suggests that if all workers were given their choice, at the same hourly rate, management would have no trouble in manning the dark hours in most industries. Many foundry workers, for example, choose the cooler night shift during half the year, and prefer it for the other half because of established sleeping habits.

Portal-to-portal pay is more amusing now that its original sting has been medicated. In the momentarily famous Mt. Clemens Pottery case (1943), Judge Frank Picard awarded a total of $2400 to 289 members of the company's union for overtime pay. This decision established the principle that "all the time during which an employee is necessarily required to be on the employer's premises, on duty . . . [he] must be accorded appropriate compensation." In a short time there were union suits against employers, estimated at five billion, for back pay.[3] The Department of Justice began to take interest when it became apparent that the government might owe industry a huge amount of tax refunds.

The Supreme Court ordered Judge Picard, who gained a certain amount of transitory fame through his decision, to figure out the "significant times" involved in his decision, which was otherwise upheld. It also suggested that the judge give attention to the legal doctrine of *de minimis non curat lex* (the law is not interested in trifles). In reconsidering the case, Judge Picard decided (1947) that the times involved were legally trifling, and dismissed it. Industry breathed a lot more freely with this removal of its longest-fringed wage potential. The purpose of this reference is chiefly to show just how far a "fringe" can hang.

Little need be said about *health and life insurance.* Benefits paid, or shared in, by employers doubtless repay the investment through better work resulting from freer minds. The final fringe benefit is the so-called *welfare fund.* Its purpose is excellent; its results can be just as good as its management. The welfare fund is a comparatively ancient and honorable institution with many companies. It was fed in the past by contributions of workers to help distressed fellows financially. In many cases flowers and gifts were paid for from the fund. More recently profits from various concessions, which are often considerable, have been assigned to the welfare fund. Then a well-known labor leader conceived the idea of creating a real welfare fund from "royalties" paid by the employers. Since royalties are usually paid for the use of others' ideas, the name given to this fringe benefit does not seem amiss. The Kaiser Company offered a $5.00 royalty on each car produced, hoping thereby to stimulate production. Many concerns are now paying royalties into employee welfare funds. Since the royalty idea has become more or less accepted, the problem has concerned the management of its funds. Labor claims it as an exclusive right; management insists on participating to protect its employees and because it feeds the fund. However that may be, co-management of the coal-mine fund by union and company representatives has been both quarrelsome and highly unsatisfactory from the standpoint of its beneficiaries.

---

[3] *New York Times,* February 9, 1947.

The vital considerations for management with respect to fringe benefits are their total amount and the proportion they constitute of total wage payments. Fringe benefits started out as relatively harmless, but they have grown to be one of the important matters for discussion at labor–management bargaining conferences. The invisible pay envelope of 1929 was about 1 per cent of wages and salaries. By 1947, this average had increased to 4 per cent; in 1951, the average figure was approximately 6 per cent. In individual cases, the figure is much higher. One of the nation's largest department stores figures its fringe wages at 14 per cent of its total payroll. Management as a whole has not begun to realize the importance of these added costs. Possibly the realization would come more quickly if management were to lump these costs with "wages and salaries." The present condition has developed because, while management has been conscious of the wage expense, it has failed to evaluate its fringe payments. In that state of mind, it has traded fringe benefits for lessened wage demands without realizing the real cost of the former.[4]

Profit sharing

The purpose of profit sharing is to enlist the interest of the workers in the general progress and prosperity of their employer. Whether profit sharing accomplishes its purpose, and in what ways, is controversial. Its proponents and adversaries are equally vociferous in their claims. One recognized writer in the field of personnel states that "profit sharing is no stimulant to production." Industrialists who have tried the plan, some for as many as twenty years, claim that it not only stimulates production, but has many intangible virtues, not the least of which is improvement in labor–management relations, with practical elimination of strikes. Although most labor leaders are against profit sharing, two or three are in favor of the idea, especially George Balsanzi, executive vice-president of the United Textile Workers' Union (CIO).[5] Labor's chief objection is that the plan aims at "pulling the wool over the worker's eyes" by claiming partnership with management, thereby keeping down wages and undermining worker loyalty to unionism.

---

[4] For a good résumé of "How to Estimate the Costs of Fringe Benefits," see *Management Methods* (February 1955), pp. 13–14.

Both sides cite statistics, often from the same source, to show that case histories prove the effectiveness or ineffectiveness of profit sharing.[6] Actually, there has been neither progress nor decline in the history of profit sharing. There was a swing in its favor in this country about 1918. The depression of the thirties naturally put a damper on the idea, but it started to gain favor again after World War II. The Council of Profit-Sharing Industries, which was organized in Ohio in 1947 had 118 participating industry members by 1949 and had issued a 647-page manual of case histories in profit sharing. In 1948, the National Industrial Conference Board issued the report cited in the previous footnote on the existing programs. One of its conclusions was that the plans were "more prevalent in small and medium-sized establishments where the worker may be in a better position to see the connection between his actions and the profitableness of his company." [7]

The NICB report also commented that the growth of deferred payment plans was a significant development of the general idea. Under these plans employees receive all or a part of their share of the profits at retirement, termination of employment, disability or death. This idea is significant tax-wise, besides making funds available at times of outstanding need. Another approach is the setting aside of shared profits for subsequent disbursement at specified times. This permits payments to be the same or similar in amount during boom and lean years.

One great economic justification for profit sharing is the limitation of its type of incentive to those years when industry and business are making a profit. Obviously also, profit sharing increases purchasing power without affecting prices except in so far as consumer demand is thereby increased. It does not add anything to the cost of production. It does not, therefore, contribute to the vicious wage–price spiral referred to by some economists.

---

[5] See the article "Labor Man for Profit Sharing," *Business Week*, No. 1058 (December 10, 1949), pp. 86–88.

[6] Authorities most often cited are: *Survey of Experience in Profit-Sharing and Possibilities of Incentive Taxation*, Report of the Subcommittee of the Committee on Finance, U. S. Senate (75th Congress, 1939); and the surveys on the subject made by the National Industrial Conference Board. For example, in 1937 the Conference Board found that of 161 companies which at one time had used a profit-sharing plan, 96, or 60 per cent, had discontinued the practice. — *Profit Sharing and Other Supplementary-Compensation Plans Covering Wage Earners* (New York: National Industrial Conference Board, Inc., Studies in Personnel Policy No. 2, 1937), p. 14. A more recent Conference Board report on the subject is: *Profit Sharing for Workers* (*Studies in Personnel Policy No. 97, 1948*).

[7] Westinghouse Electric & Manufacturing Company (Pittsburgh) and the Carrier Corporation (Syracuse) are two large concerns with profit-sharing plans.

Its adherents claim that profit sharing reduces the cost of supervision because of stimulated interest by the workers. Marked improvement in labor-management relations is another advantage claimed by many businesses which have used the plan. This naturally leads, as has been mentioned, to decreased costs because of fewer work stoppages. The adversaries' claim that profit sharing leads to worker interference with management prerogatives is denied quite generally by those with experience.

Those opposed to profit sharing point out that large companies like General Electric abandoned the idea in 1947 after a fair trial. At that same time there was an upward trend in the use of the plan. Opponents note further that profit sharing cannot be applied to industry generally, but only to those concerns with a long profit record, and that the plan is vulnerable in any case because of the uncertainties of profits. They point out its limited applications in various countries over a period of 125 years, and that more than 60 per cent of the plans have been dropped in the United States. Labor unions, they emphasize, are usually opposed to profit sharing, claiming that such funds belong in the pay envelope. Changes of management, and mergers, are two of the operating difficulties of the plan. It is contended that many of the plans are too involved for worker understanding. In any case, profit sharing should be introduced during a period of continuing profits. In some cases its introduction is poorly timed, with disappointing consequences.

There are various bases for distribution of profits to employees. Period of service is a favorite, percentage of wages is another, and there are still others. The existing wage structure should be maintained when a profit-sharing plan is installed, so that the workers shall have nothing to lose; also, profits should not be shared until after reserves and dividends have been provided for.

The National Tag Company's plant at Dayton, Ohio, worked out the formula shown in Figure 24.1, through its Junior Board, for distribution of the production employees' share in the company's profits. It is not claimed that this case is typical. Rather it was fitted to the local situation, and contains several distributive factors.[8] So that the relation between production and profits would be emphasized, the idea was referred to as the "Production Bonus Plan."

Stock ownership

We have already had occasion to discuss employee ownership of company stock. It was seen in the chapter on Financial Management that the

---

[8] The author was technical advisor to the Junior Board of Directors of the Company at the time this plan was drafted and later accepted by the Company, in 1947.

FIGURE 24.1

PRODUCTION BONUS PLAN

The amounts to be distributed to individual production workers under this Production Bonus Plan shall be based on the so-called *Point System,* in which point values shall be assigned to the various factors listed below, in accordance with the ranges as provided:

1. *Length of Service.* One (1) point for each year of continuous service.
   a. Continuous service shall not be interrupted by service in the Armed Forces of the United States.
   b. Continuous service shall not be interrupted by layoffs dictated by Company production necessities.

2. *Attendance.* Good (not over 3 days per year) —— 20 points
   Fair (not over 10 days per year) —— 10 points
   Poor (not over 15 days per year) —— 5 points
   a. Attendance records shall not be affected adversely by absences caused by Company production policy.
   b. Attendance records shall not be affected adversely by absences caused by injuries received while on the job.

3. *Attitude.* Good —— 20 points
   Fair —— 10 points
   Poor —— 0 points
   "Attitude" means general cooperation of the type that promotes good will among employees and with foremen, resulting in improved quantity and quality production.
   Ratings for this factor shall be made by Management.

4. *Tardiness.* More than 15 times —— 5 points off the score
   Note: This allows for about one tardiness every three weeks.

5. *Rate of Pay.*
   The total of the points for Factors 1–4 inclusive shall be multiplied by the base pay rate in order to establish weighted averages.

Determination of Individual Production Bonus

1. The total of the weighted point values of all production workers shall be divided into the total amount of the production bonus to be distributed to production workers. This result determines the money value of the point.
2. Multiply the weighted point value for each individual production worker by the money value of the point as determined in the preceding paragraph. This result represents the money bonus to be paid to the employee concerned.

sale of stock to employees has been used in a limited way as an aid in external financing. In the chapter on Personnel Relations, employee stock ownership was described as a plan for enlisting the loyalty of the workers, and the history of the workers' disillusionment with the plan was traced.

To recapitulate, an upsurge of employee stock ownership followed World War I. It was believed that the only real way to tie the worker to his company was to let him actually own a vested interest. Common-stock participation was offered on the installment plan. It was felt that stock-owning employees would be less critical of management, while the payroll plan of purchase was promoting thrift.

Whereas the profit-sharing worker participated in his company's good times, the stock-owning worker also shared its poor times. With the depression of the thirties, many employees offered their company stock for sale because they needed cash. Then they found out that the same situation which made them short of cash — part-time employment — turned company profits into losses. If the stock was "listed," the price offered was frequently less than half what the worker had paid for it. In some cases, the market was as low as 10 per cent. When there was no organized market, offers to buy were scarce at any price. For once, the worker looked at the economy from management's point of view, and he did not like what he saw. In most cases he felt that he had been imposed on, and company loyalty was at a premium. Those who had left the company before the break in the market, and hence had had part of their payments returned to them, were considered lucky.

It is rather easy to conclude that employee stock ownership, especially of common stocks, has not been successful. In most cases, companies now offer their common stocks to executives who, because of their broader experience, will blame the market rather than the company when the wrong phase of the cycle hits. Stock distribution to lower-paid employees has tended to be restricted for some time to preferred issues, where the dividend record is safer, even if the market price is not. Some of the utilities have been aggressive in selling their preferred stock to both employees and customers, usually to create better public relations. Because of the attitude of most state public service commissions toward the return on utility capitalization, such securities have represented a conservative investment. Purchase of common stocks by the rank and file can lead to worse rather than better relations with the employer who adopts the plan.

Pensions

Pension plans of private concerns helped stimulate the public demand for social security, including its pension features. The establishment of federal Social Security, in turn, reacted as an ever greater stimulus to the general spread of private pensions, even among small and medium-sized concerns.

Pensions pose several difficult administrative problems. One, and probably the greatest, arises from their comparative newness. Until a pension fund has attained financial strength, which can be tested only after maturity of its benefit payments, it is in the problematical category.

Evidence that pension systems have not been completely sold to workers appears in the negative pension vote of Ford employees to the company's rather generous offer of 1947. The question was whether the workers preferred an 11½¢ straight pay raise, plus about 3½¢ more for paid holidays, or a split of the same 15¢ which would allocate 8¢ to the pension fund and 7¢ to increased pay. High prices, union politics, and the provision for a 2-per-cent employee contribution to the fund, all influenced the final vote. It also is probable that the vote was split by age groups. Workers past forty have a more pressing interest in pension plans.

Another difficulty of the employee pension plans of private business is the dispute about who shall make the contributions to the pension fund (or pay the premiums, if the risk is assumed by an insurance company). The employers often favor a 50-per-cent contribution by the employees, on the ground that it is the employees who get the full benefit of the fund. The employees, on the other hand, hold out for full payment by the company in most cases, arguing that pension costs are really an expense of doing business. Because the employees have won the decision in most cases, it is probably the consumer who bears the brunt of the expense in the end.

The newest problem in pension plans is the resistance of the older workers to compulsory retirement. They argue that the psychological effect is bad if the employee is still fit, and that pension payments force a reduction in living standards. They also point out that the company suffers in many cases where the employee between sixty and seventy is often better qualified and more dependable than many of his juniors. This problem was thrown into the courts when a group of prospective pensioners of the Firestone Tire & Rubber Company asked for an injunction against the pension plan negotiated by their union. The question for which they asked a legal opinion was whether it was permissible for a union to bargain away their right to work at any specified age. With increasing longevity, it is not unreasonable to expect oldsters to form a national association for the legal protection of their right to work. This is simply the industrial phase of the increasingly general problem of geriatrics.

Another pension problem is caused by loss of retirement payments by workers shifting employment. With the increasing mobility of labor, this problem will develop on a national scale. Its ultimate solution must be on some territorial basis. In the meantime, initial attacks against current handling of the problem are proceeding on an "area-wide" basis. Exchange of seniority among a group of small companies in the Toledo area failed because of internal union politics. In the latter part of 1950, the first of such agreements was made with seventy tool and die shops in the district area. Because of the prevalence of joint labor–management contract negotiations with groups of similar industries on an area basis, it is only reasonable to assume that area-wide pension-eligibility arrangements will be progressively added to many contracts.

Group annuity plans are favored by large companies. The Vick Chemical Company, for example, contributes 5 per cent of the first $3000 of the employee's base wage, plus 10 per cent of base pay between $3000 and $15,000. After three years the plan is contributory for those workers who elect to participate to the extent of 2½ per cent of the wage up to $3000 and 5 per cent between that amount and $15,000. The company contributes an equal amount. The fund buys group annuities from a regular life insurance company. Payments to employees depend on earnings, age and sex.

The *trusteed system* is used by about one thousand companies. Some plans provide for worker participation, while others are paid for entirely by the company. Pension payments are made directly from the fund, the amount being related to years of service, age and salary.

The *individual policy trust* provides for the purchase of individual employee annuity policies from insurance companies and is usually contributory. This is probably the most widely used plan and is particularly adaptable to small and medium-sized companies.

Retirement plans *financed from profit sharing* are not so popular but have outstanding adherents. Sears Roebuck & Company has been operating this system for over thirty years with the blessings of both employees and the company. By 1947 the pension fund totaled about $122,000,000, of which $58,500,000 had been paid out in benefits.

QUESTIONS

1. What is your opinion of the cost-of-living as a regulator of the wage level? If you favor it, would you provide increased wage differentials for married men with families, and if so, on what basis?
2. If, as generally agreed, the worker's contribution to production or business is the best plan for determining his wages, how would you apply the rule?
3. Remuneration based on productivity (the rate of production) is becoming more generally accepted in industry. If you consider this a fair basis for rewarding effort, how would you apply it to a specific service activity, or to some phase of clerical work?
4. Assuming that workers are better satisfied when management provides definite policies in writing, what would you include in such a declaration of wage policies?
5. To what extent is it true, as is often claimed, that wage increases raise costs, and therefore increase selling prices? Support your decision. Can prices fall while wages are rising? Why?
6. Under what circumstances are workers not benefited by a general wage increase?
7. Since the determination of facts is an important element of the scientific approach to problem solutions, why is it that the presidential fact-finding boards have not contributed better solutions to wage disputes?

8. What restrictions should be applied to the guaranteed annual wage to provide reasonable assurance that companies using the plan will be able to meet their obligations? What fundamental factor of industry must be corrected to make guaranteed wage plans generally feasible?
9. What is the relation between wage and job stabilization?
10. What would be your idea for promoting a more realistic approach to the growing problem of fringe benefits? Could productivity be applied in some way as a measure of such benefits?
11. To what extent, in your opinion, should severance pay be compulsory for relieving the financial burdens of employees who become jobless because of technological improvements? If you favor compulsory severance payments, who should pay the bill? What is the basis for your decision?
12. It is an established fact that most kinds of insurance cost less on the group plan than when placed by an individual. Do you feel that the cost of company-placed insurance should be contributed to by the employees? Would the kind of insurance make any difference in your answer?
13. Do you favor employee profit sharing in principle, and if so, on what basis? If you are opposed to the idea, what are your reasons?
14. What is your solution to the compulsory age retirement provision under a group pension plan?

CASE PROBLEM

THE STANDARD SOAP CORPORATION

The Standard Soap Corporation has been notified by the union which has the bargaining power for all of its production employees that it will demand a guaranteed annual wage in its next contract. The present labor–management agreement expires in one month. The union did not include details in its demand, but did state that nothing less than a fifty-week guarantee on a forty-hour basis would be satisfactory.

Standard has been in business for ten years. During that period, it has expanded rapidly from 25 to about 300 employees. Its annual sales volume has increased from approximately $50,000 to nearly $1,000,000. The physical expansion required for this growth in the business was financed partly by mortgage and a preferred stock issue. About one-third of the new financing came from plowed-back profits, to which there was no stockholder objection chiefly because the stock is closely held. All of the large stockholders are officers of the company, drawing rather small salaries because of their desire to build their equities in the business.

The small group of owner-operators are all practical soap-makers, with little training in business methods. They have forged ahead by working long hours and watching production costs and customer credit risks. They learned from current business publications that there is a growing demand by organized labor for a guaranteed wage, but have given no special attention to the subject, probably because they felt that the lightning would not strike such a small business.

The concern's wages compare favorably with the industry and with community standards. It has also developed recreational and other employee programs, and operated a plant cafeteria where meals are sold below cost.

Profits have been fairly good ever since the business started, and have been higher than average for the past three years. The financial statement is excellent for the size of the company, but has never appeared in print except as a general summary in Dun & Bradstreet reports.

Although annual sales have been good, and always on an upward curve, the nature of the business brings the heavy volume at house-cleaning seasons, with usually a 50 per cent layoff of workers for two to three weeks during the summer and winter months.

PROBLEM. Standard has a real problem on its hands, and is deeply concerned, to say the least. If you were engaged as its representative to deal with the union in settling this new demand, what information would you gather to present your case? What plan of approach would you develop, and what reasons would you include in your argument opposing the union's demand "at this time"? Would you employ any specialist to assist you, and if so, from what field? If you were forced, as a result of the negotiations, to offer some compromise plan, what would it include?

CHAPTER 25 Wage Plans

That the payment of wages for work performed is a matter of some complexity should be clear from the preceding chapter. The employer, who attempts to turn out his goods or services at a profit, must always try to keep the cost of labor per unit of output at a minimum. On the other hand, since the wages that he pays are usually the sole determinants of the living standards of his employees, it is to their interest to keep wages high. The resolution of this conflict — the determination of a formula that will be considered equitable to both the employer and the worker — has been a constant challenge to management, causing many different plans to be devised. Underlying all these plans are two basic methods of payment. With the first method, usually referred to as *day work,* the wage is based on the amount of time spent on the job, regardless of how much has been accomplished during that time. The unit of time here may be an hour, a day, a week, a month or a year. Traditionally, manual workers have been paid by the hour, white-collar workers by some larger unit of time. The second method is to pay the worker directly on the basis of how much he produces, regardless of the time it takes him. This method, in its pure form, is known as *straight piece work* — so much money per unit of output.

All modern systems of wage payment are variations or combinations of these two plans. The problem of this chapter is to evaluate the strengths and weaknesses of both plans and to see under what conditions the two systems can best be made to serve the purpose of resolving the conflict between management's desire to keep the cost of labor per unit of output low and the workers' desire to maximize wages, irrespective of the cost to the employer.

The Background of Modern Wage Plans

Day work

Day work and piece work are both very old, going back to ancient times.[1]

---

[1] For examples, see H. S. Person, "Labor, Methods of Remuneration for," *Encyclopedia of the Social Sciences* (New York: The Macmillan Company, 1948).

Before the rise of the factory system, the choice of which plan to use was probably regarded by the employer as a matter of convenience. When a man was hired to perform a variety of different jobs, or when the quality of execution was more important than mere quantity produced, the day wage was the common form of remuneration. But when work was farmed out to be done at home, and consequently the employer had no check on how much time was required, piece rates were the logical method of remuneration.[2] With the rise of the factory and the great increase in the number of people who depended on wages for their chief means of subsistence, the question of day work versus piece work took on a new significance.

In the early days of mass production, day work was the rule. The method of paying workers by the hour had the great virtue of being an easy system to administer. Theoretically, at least, workers being paid by the hour would not feel pressed to sacrifice the quality of their production for sheer quantity, although whether the day wage actually makes for higher quality than other forms of payment remains unproved to the present day. There were also disadvantages to day work. It was hard for an employer to know in advance what a given amount of production was going to cost him, or even what it ought to cost; and the suspicion was always there, in the employer's mind, that it was costing him too much.

The problem can be summed up very simply. Men work at different rates of speed. When a straight hourly rate is paid for a particular type of work, the slowest man is receiving the same amount of pay as the fastest, but the employer is not getting as much for his money from the former as from the latter. If the difference in productivity were entirely attributable to innate differences in the workers, then the employer might try to strike a balance between the fastest and the slowest and base the hourly rate on the production of the average worker in any group. But this solution assumes that each man is working to the best of his ability, and history has proved that such an assumption is unwise. The employer might often be right if he assumed that the majority of workers were deliberately keeping their output down to the level of the slower-than-average worker. The reasons for such a slowdown are many. For one thing, there is no immediate financial gain for the worker who increases his effort under the straight hourly wage system. Even though extra effort may result eventually in promotion for the worker, or give him a better chance of retaining his job when a decrease in the size of the working force is desired, these rewards are relatively far away from the day-to-day routine, and are perhaps never so effective in raising the worker's motivation to produce as are the immediate financial rewards of piece work.

---

[2] Even today, piece rates are almost universally paid in those European centers specializing in the making of such quality items as beaded bags. The patterns are beaded at the homes of workers, whose piece rates depend on the complexity of the designs. The same wage pattern exists in many other handwork processes.

Piece work and the problem of incentives

The historical reasons for the deliberate slowdown of production were more than economic. As we have already seen in discussing the problems of personnel relations, the breakdown of the crafts into simple, repetitive operations, with each different operation performed by a different person, robbed the worker of that pride in craftsmanship that made a man's work psychologically rewarding, whatever his pay. In our treatment of morale, we used the word incentive to refer very broadly to anything that spurs a worker on to his maximum productivity — in short, anything that makes the worker want to do the things that management expects him to do. Various nonfinancial incentives, which motivate the worker both on and off the job, were described in Chapter 21. Elsewhere in the book we have had occasion from time to time to mention monetary incentives which are not, strictly speaking, part of the worker's wage; these include such things as annual bonuses or special bonuses paid for time-saving ideas, employee stock-ownership plans and profit sharing. All of these incentives differ from piece work, and the wage plans that followed it, in that none of them is geared directly to output in such a way that as a worker's productivity increases, his earnings increase, and as his output falls, there is a corresponding drop in his wages. We may view incentive-wage systems as part of the general search for ways of motivating productivity, but let us restrict the definition of an *incentive-wage plan* to one in which *a worker's earnings vary — both upward and downward — in some fixed ratio with his output.*

Before the Industrial Revolution, as we have suggested, piece work was not primarily thought of as an incentive to greater productivity; its use was more likely to have been merely a matter of convenience to the employer. But as the factories began to grow, employers came to see that they were paying large amounts of money for relatively unproductive labor. Thus, in the last half of the nineteenth century, there was a widespread movement among industrialists to substitute piece work for day work, as a method of rewarding the worker directly for his output, rather than for the amount of time he spent on the job. As such, piece work became the model for all later wage-incentive plans.

In its pure form, the straight piece-work system was as easy to administer as day work. Every unit of production was paid for by the piece. A worker's wage was simply the number of pieces he turned out multiplied by the rate for each piece. Management now had a way of figuring labor costs to precision. And any worker who put out extra effort could take home a wage far higher than he had received as a day worker. Thus it seemed that piece work, as a solution to the perennial wage conflict between management and labor, was a satisfactory plan for both sides. But no sooner had the plan come into general use than problems began to arise. For a time it was the workers who suffered most from the new system, but it was not long before employers, too, discovered that piece work was no panacea.

When plants began to change over from day work to piece work, it was found again and again that individual productivity would suddenly rise — that the day workers, as management had suspected all along, really *had* been restricting their output. The piece workers, spurred on by the promise of the new high wages, devised more efficient methods for turning out their pieces. Furthermore, this was a period of rapid acceleration in the tempo of technological innovation. New machines were forever shortening the time in which a piece could be produced.

This spurt in productivity, if piece rates remained constant, resulted in all the gains going to the worker. If the rise in output were entirely attributable to the increased effort of the workers, then it was just and reasonable that they should receive at least a large portion of the gain. On the other hand, the new high levels of production often represented not simply increased worker effort but also large investments by the employer in new labor-saving machinery. In such cases, it was unreasonable to expect the employer to go on paying the same piece rates and put himself in danger, at times, of suffering a real loss. But whether justified or not, the general reaction of business owners and management was to cut the piece rates as soon as individual productivity began to rise. Naturally labor protested. It soon became common practice for the workers to defeat the purpose of the incentive system by deliberately restricting output for fear of new rate cuts when the level of productivity rose appreciably. Furthermore, the argument that day workers often advanced for restricting output — that if they worked too fast there would soon be no work left for them to do — was every bit as pertinent for piece workers, and often more so.

A second source of hardship for the worker on piece rates was that his income stopped altogether whenever there was an interruption in the flow of work. When machines broke down or the supply of materials ran out, there was a temporary layoff for the worker.

Because of these very real disadvantages, piece work — and incentive wage plans in general — came to be feared and hated by a large proportion of the workers, and this distrust has persisted among important sections of the labor force down to the present day.

Many of the employers were undoubtedly taking advantage of their workers. But many others were seriously disturbed. They had sincerely tried to find a just formula for gearing wages to output, and they saw that the formula was not always working out in practice. Aside from the hostility of labor — something which no employer chooses to face — the piece-work system was revealing serious flaws. In some establishments, as we have said, workers were tending to restrict their output to a point just below the level where they feared there would be a further cut in the piece rates. In other places, as rates were cut, workers tried ever harder to keep their earnings at the level of the previous, higher rate; but there was a limit to what they could produce, and in the effort to exceed that limit, the quality of the output often deteriorated, sometimes to such a degree that the employer was losing more money on production waste than he had lost through low productivity under the day wage.

It became clear, then, that if the idea of incentive wages was to work out in practice, several conditions had to be satisfied. (1) Some method had to be found for stabilizing piece rates. Because technological progress — and hence a continual rise in the level of productivity which was quite independent of the amount of individual worker effort expended — could be taken for granted, employers could not be expected to promise their workers that rates would remain fixed for all time. On the other hand, the vicious circle which found the industrious worker putting out ever more effort only to be met with a new cut in the rates, was grossly unfair to labor and could not be permitted to continue. (2) If labor were ever going to give its whole-hearted support to the incentive system, some form of remuneration during periods of downtime beyond the worker's control had to be guaranteed. (3) Because of the low repute in which workers had come to hold the very idea of incentive wages, management had a major problem on its hands of convincing the workers that piece work was not a method of "sweating" the workers simply to fill the company coffers, but was a genuine plan for rewarding extra effort with extra pay, to the mutual advantage of management and labor.

Let us turn now to a consideration of modern incentive-wage plans and see what steps have been taken to meet these conditions.

Modern Incentive-Wage Plans

Piece rates versus standard times

It was in the area of setting the rates that scientific management made its first attack on the problem of incentives. Originally, piece rates had been set on the basis of experience, either by guess work or, where records were available, by calculating the average production for some past period. The rate was expressed in terms of money — so much a piece, a ton, and so on.

With the introduction of the Halsey Premium Plan in 1891 and of the incentive systems which followed shortly after it, the idea of "money per piece" was supplanted by the notion of "time spent per task." Although some of the standard-time plans vary from the model we are about to present, the pattern is basically the same. Under these plans, all operations are divided into "standard tasks," and a "standard time" for the performance of each task. For performing the required task, the worker is paid a base wage, which for all practical purposes is the same thing as the time-rated day wage. Most plans guarantee him this base wage, whether or not he meets the standard-task time, and also during periods of downtime. Incentives are introduced into the system by paying a "premium" or "bonus" to the worker who performs his job in less than task time. (The amount of the premium and the way of calculating it vary from plan to plan; some of these variations will be discussed below.) In a sense, standard-time plans are a compromise between the hourly-rated wage of day work and the incentive idea of piece work. It is a compromise from the employer's point of view because, among other differences, he is sometimes paying the worker for unproductive time spent on the job, and consequently he cannot calculate his labor costs per unit of output with the precision of the straight piecework system. At the same time, he retains an important benefit of piece work, because above a certain base line, he is able to gear payment to output. In effect, standard-time plans have altered the definition of incentive-wage plans to read: *extra pay for extra output.* This new feature, which makes of incentive pay something given the worker *in addition* to his base pay, has undoubtedly gone a long way toward making incentives attractive to the worker.

A second advantage over piece work — although the difference is largely psychological — is that when the employer is forced to lower wages because of fluctuations of the market or the introduction of new time-saving machinery, he can maintain the basic hourly rate at the previous level and make the changes only in the premium pay.

Setting the Task Time. The problem remains of setting the standard time for the performance of each task. When Halsey first introduced his plan in the late nineteenth century, standard times were established largely on the basis of past records. These records were more accurate and more detailed than any that had been kept in the period before piece rates were introduced, but being records of past experience, they provided no adequate method for coping with the dynamics of technological change. A truly scientific basis for setting standard times was still wanting.

It was not until Taylor and his associates began their time and motion studies, at the turn of the century, that this scientific basis was discovered.[3] By breaking down each task into its component sequences of motion ("elements"), the time-study man was able not only to determine the time that the average experienced worker should spend on a job but, in the process, he was also able to observe wasteful sequences of motion and to suggest a "one best way" for doing the job.

Time and motion studies were bitterly attacked by labor when they were first introduced, and that opposition still continues in many quarters. The workers' early apprehensions were understandable in the light of their experience with piece-rate cutting. Furthermore, as we cautioned in Chapter 17, workers distrust a process which they do not understand; and though Taylor himself stressed the importance of explaining to the workmen the purpose and the methods of time study, many of the minor lights in the "Efficiency Movement" ignored the master's warning. It is an unfortunate paradox of history that labor so resented Taylor's time and motion study, because there can be no doubt that Taylor was sincere in trying to find a solution to the problem of speed-up and unnecessary exhaustion which characterized the piece-work system. Not only did he try; in large measure, he succeeded. Taylor observed that there was glaring inefficiency in almost every job being performed in his day. Through careful analysis of worker motions and of the machines and tools being used, he felt that most workers could achieve higher productivity with far less effort than was the case with the methods then current. We have already seen, in Chapter 2, how Taylor applied this principle to the physical exhaustion of the heavy laborer, and how, by following his methods, the laborer could earn more than ever before with less physical exhaustion. The important point for the present discussion is that methods and time studies were a way of ending the race to work ever faster to keep up with the ever lowering rates. Time studies demonstrated to workers and managers alike that standard times could be established objectively for operators using the one best sequence of motions known at the time. The rate could be based on this average performance, and only when it could be shown that significant improvements had been effected in the method of performing a standard task should the question of re-timing arise.

---

[3] Since the whole of Chapter 17 is devoted to the techniques of methods and time study, they will not be described in detail here.

Since Taylor's day, a widening range of jobs has yielded to the techniques of methods and time study. Standard times are still being set on the basis of past production records in some places, but the trend is definitely toward individual time studies or the use of standard data.[4]

After standard times have been set, it is customary to pay premiums proportionate to output in excess of the standard. Under some systems, part of this premium is paid to foremen, or indirect workers, or both. (This is known as the "split premium.")

Under systems where the standard is "tight" (that is, where the worker is expected to perform the standard task in a comparatively short time), it is customary to start premium payments at some point slower than the standard. On the other hand, where the standard is "loose," the worker may be paid a premium which is less than proportionate to the rate of production in excess of the standard. For example, the premium may be based on one-half of production in excess of the standard. This plan is used to encourage workers by allowing most of them to beat the standard time. Another adaptation of the general plan is to provide for stepped-up premiums at various levels above the standard, to furnish extra incentives.

With this general background, we shall now turn to a description of some of the best-known incentive plans, after which an attempt will be made to evaluate the present status of incentive-wage systems in American business.

Standard-time plans

The 100-Per-Cent Premium Plan. This plan sets standard times either from past production records or by time study. Each job classification has a base rate. If the standard time, or task rate, is 60 minutes, and the worker completes his task in 40 minutes, he receives a full hour's pay for what he has accomplished in 40 minutes and has 20 minutes left over to start another operation. If the worker takes 65 minutes to complete the same job, he is still paid the base hourly rate, which is guaranteed.

---

[4] See p. 340 for an explanation of standard data.

Thus it will be seen that this plan circumvents a major worker objection to piece work by paying a time wage regardless of output. On the other hand, when the worker is bettering the standard-task time, he receives the full rate for all of his extra output, as is the case under piece work. Because this plan gives the worker full benefit for his effort and skill in beating the standard, it is probably the most popular of the standard-time plans with labor.

Taylor Differential Piece-Rate Plan. This plan is based on standard times determined by time study. It provides for two piece rates for each job classification. The lower rate is paid when the worker's time falls below the standard. The higher rate is paid when the standard is met or bettered. For example, if the standard time is 30 pieces per hour, and the differential rates are 20¢ and 30¢, the worker completing 30 pieces would be paid 30 × 30¢, or $9.00, while the worker completing only 25 pieces would earn 25 × 20¢, or $5.00.

Taylor conceived this plan on the assumption that low wages do not necessarily mean low-cost production. In conformity with his basic concept of the contributions which management and labor should make to the productive processes, he contended that it was up to management to plan the elements of production so that the mediocre worker *could* attain standard production, and thus reduce unit labor and overhead costs. Taylor felt that the high incentive given to fast workers would encourage most of the workers so that they *would* lower unit costs.

Taylor's plan has not gained wide adoption because of its several outstanding disadvantages under present social concepts of business:

1. Unless management performs its production planning and job control in a highly skillful manner, the worker's chances for meeting the standard are poor.
2. Pay for the poor or inexperienced worker is so low as to discourage him from seeking employment where the plan is in operation.
3. There is no guaranteed base rate.
4. The average worker so extends himself in trying to meet the standard that unions charge "speed-up" with some justification.

Merrick Multiple Piece-Rate Plan. This plan is similar to Taylor's, except that it provides for two premium rates:

Up to 83% of standard	Low piece rate × number of pieces
From 83% to standard	Regular piece rate × number of pieces
Standard and above	High piece rate × number of pieces

The virtue of this system as compared to Taylor's is in the added encouragement it gives to the mediocre worker.

Halsey Premium Plan. The system of F. A. Halsey was the first standard-time plan to be introduced into American industry. The standard-task time is determined from past production records, which have naturally been made on a straight-time basis, and so tend to favor the workers on the new incentive plan. This method of setting standards eliminates the necessity for time study, which sometimes makes the plan more acceptable to the workers. From this standpoint, the Halsey plan offers a good transition from hourly wages to incentives based on time study or standard data.

The hourly wage is guaranteed irrespective of ability to meet the standard time. All time saved from the standard is shared by the worker on some agreed division, usually one-half. For this reason the plan is sometimes referred to as the 50–50 plan. The other 50 per cent is shared in some predetermined ratio with supervision, indirect workers and the company. While workers appreciate the opportunity to earn a premium without possibility of loss, they naturally prefer an incentive plan which pays 100 per cent of the time they save.

Rowan Premium Plan. The Rowan plan also guarantees pay at the base rate for all hours worked, and like the Halsey plan, its standard times are set on the basis of past production records. It differs slightly in calculating the premium in that it adds to the worker's actual time a percentage of that time. The percentage is the ratio of the time saved to the standard time. If the worker saves one-third of the standard time, his pay is figured as one and one-third of his actual time for operation. His pay under this plan would be less than the 100-per-cent premium. Compared to the Halsey plan, it pays larger premiums for small savings, but it pays smaller proportionate premiums as the time savings increase. The purpose of this refinement of the Halsey plan is to make workers conscious of their premium earnings as soon as they start to improve on the standard time.

Emerson Efficiency-Bonus Plan. This plan guarantees the day rate and provides for premiums on a graduated scale proportionate to productivity. Standard times are fixed by time study under existing working conditions. To encourage new workers, a premium is paid when 67 per cent of the standard time has been accomplished. From this starting point, where the premium is only one-fourth of 1 per cent, it increases gradually up to 20 per cent. If the worker beats the standard time he receives an additional wage equal to the time saved, at the base rate. Premiums are figured for pay periods rather than for each operation, on the basis of the worker's efficiency rating. This rating, which is calculated by dividing the total of the standard times by the total of his actual times, reflects the worker's actual efficiency percentage, and reduces the amount of payroll work. The disadvantage of this plan is its complicated calculations, which are confusing to the worker.

Gantt Task-and-Bonus Plan. This plan guarantees the day rate for working time, plus another guaranteed rate for downtime caused by machine breakdown, lack of materials, or any other factor beyond the control of the operator. The worker receives his base rate for standard time or any time less than standard, with a sliding-scale percentage premium of the base rate, determined by the nature of the work. The object in fixing the premium percentages is to arrive at figures which will encourage maximum productivity. The standard time is fixed either by time study or from production records.

Gantt also made a contribution with respect to the foreman's pay. He suggested that foremen receive premium pay based on the number of his men who earned wage premiums. His purpose was to stimulate foremen not only to train their men in the best methods, but to make every effort to see that they were supplied with good machines, tools and workplaces, and the proper materials on time.

Bedaux Plan. The underlying feature of this time-standard plan is the Bedaux unit of time, or "B." The "B" includes calculated time for operating and resting, the proportion of the two depending on the circumstances of the work. Accomplishment is measured by the number of "B" units per hour. Sixty B's make the standard hour. The original plan gave the operator 75 per cent of the premium, retaining 25 per cent for supervisory and indirect labor. Many variations of this split premium have developed; in some cases the entire premium goes to the worker. The wage, on a 100-per-cent premium basis, is obtained by multiplying one-sixtieth of the base rate by the number of B's obtained.

Standards are fixed after a careful analysis of all the factors in a given operation. The operator is given credit for one B for each minute of downtime caused by circumstances beyond his control. Since the B is a standard unit of work measurement, production records can be used for comparative purposes among all types of workers in all departments. This feature is important as a primary tool in production control. Obviously this plan involves considerable clerical work as well as professional expense in fixing the B standards. The question of its worth as a wage determinant and control feature for individual and group production must be determined on a factual basis for each industry.

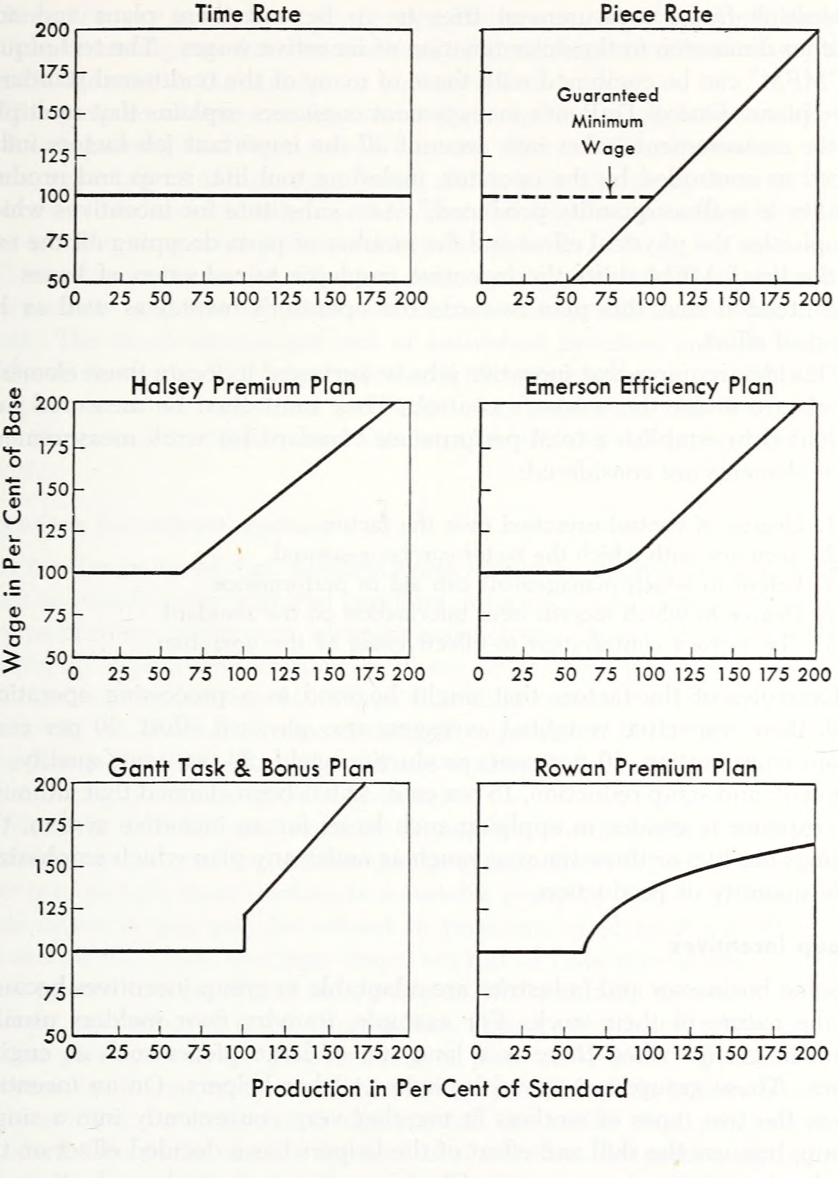
Figure 25.1 compares the earning curves of six wage plans. On the horizontal axis is plotted the proportion of the standard task accomplished by the worker. The vertical axis shows the worker's wage as a percentage of his base pay per hour. The time rate appears, of course, as a straight horizontal line, since the wages of the time-rated worker do not vary with output but only with hours worked.

Multiple-factor measurement

The incentive plans just described vary from one another in the way in

FIGURE 25.1

Earning Curves under Six Wage Plans



which they measure standard times and reward extra productivity. All this variation focuses about *quantity* of output. The plans have been presented in their "pure" forms, as they first appeared on the industrial scene. Today there are as many as two hundred different plans available. Almost all of these are the result of combining features of two or more existing plans. For example, by adding time study to a plan which historically was based on standard times derived from past production records, a "new" plan is born.

Multiple-factor measurement tries to go beyond these plans and add another dimension to the determination of incentive wages. The techniques of "MFM" can be combined with those of many of the traditional standard-time plans. One of DuPont's management engineers explains that multiple-factor measurement "takes into account *all* the important job factors influenced or controlled by the operator, including tool life, scrap and product quality as well as quantity produced." As a substitute for incentives which "emphasize the physical effort and the number of parts dropping off the end of the line," MFM shifts the incentive emphasis to reduction of losses. It is contended that this plan rewards the operator's mental as well as his physical effort.

This idea requires that incentive jobs be surveyed to locate those elements which are under the worker's control. They must then be measured and weighted to establish a total performance standard for work measurement. Five elements are considered:

1. Degree of control exercised over the factor
2. Accuracy with which the factor can be measured
3. Extent to which management can aid in performance
4. Degree to which records offer information on the standard
5. The factor's contribution to effectiveness of the operation

Examples of the factors that might be used in a processing operation, with their respective weighted averages, are: physical effort, 30 per cent; steam consumption, 10 per cent; production yield, 20 per cent; quality, 25 per cent; and scrap reduction, 15 per cent. It has been claimed that although the expense is greater in applying such bases for an incentive system, the savings are two or three times as much as under any plan which emphasizes only quantity of production.

Group incentives

Some businesses and industries are adaptable to group incentives because of the nature of their work. For example, foundry floor molders usually work in groups when there is a long run of large pieces such as engine bases. These groups are served by indirect labor helpers. On an incentive basis, the two types of workers fit together very conveniently into a single group, because the skill and effort of the helpers has a decided effect on the production of the journeymen. Electric motor and steel production are other examples of natural group effort.

Group incentive plans have varied degrees of success, depending largely on the natural cohesiveness of the work group. When the groups are more or less artificial, these plans are likely to fail. Even natural groups may occasionally find themselves in situations which reduce their effectiveness. For example, if the journeymen floor molders belong to one union while their unskilled helpers are affiliated with another, there might well be friction.

Premium pay is based on production above a set standard for the group. It is split among members on the basis of their respective total wage, their base wage rate or the number of hours worked.

The purpose of this plan is to increase production through teamwork, but it is only natural that there should be some slow individual members of the team, especially if the group is large. Ordinarily, the group interest either spurs such individuals to carry their share of the load or makes them feel that transfer to another job would be advisable.

The advantages to be expected from group incentives are increasing productivity and worker pay, with decreased supervision and accounting costs. The disadvantages are lack of individual incentive and the impossibility of measuring individual efficiency. To some extent, disadvantages of the plan are due to unnatural groupings. Any good team must be relatively free of personality clashes, and this is especially true of group production effort.

Incentives for indirect workers

It is often believed that standard times cannot be applied to such indirect work as maintenance, material handling, inspection and clerical work, or to groups of oilers, setup men, cleaners and helpers. As we learn more about analyzing repetitive operations in these fields they will yield slowly to standard-time measurement. When that time comes, the costs of indirect labor will no doubt be reduced through supervision based on established time factors. Until then, many of these workers will continue to be thought of as among the "blind spots" of business.

When the calculation of standard times is not feasible, other less scientific methods can be used for establishing premium wages for indirect workers. One is *to include these workers in a suitable group of direct workers,* where their incentive pay may be related to premiums paid to direct labor and figured on total base earnings, hours worked or base rate of pay. Another plan relates the premiums to *quality of the product,* to which indirect workers are acknowledged contributors. Some companies relate indirect worker premiums to the accident rate or plant cleanliness, when these are relevant, or the record for meeting delivery schedules.[5] It becomes increasingly evident, as studies and experiments are made, that piece-work or standard-time plans can be applied to a considerable portion of indirect labor. In many cases where this is not feasible, proper analysis can establish a workable ratio of indirect- to direct-labor standard hours as a basis for determining premium pay for indirect labor. In these cases, the number of indirect-labor standard hours produced, divided by the number of indirect labor's actual hours, will fix the efficiency percentage of the group. Earnings of each member would be determined by multiplying his actual hours by his base rate and then by the efficiency percentage of the group.

---

[5] The American Rolling Mills Company of Middletown, Ohio and the E. I. Dupont Company of Wilmington, Delaware have worked out excellent standards for application of incentive wages to indirect workers.

Foremen should receive attention in any consideration of incentive-wage payments. The two general approaches to this problem are through the measurement of either productivity or savings. Both relate to the foreman as a member of management. Because his position is so important in the general field of management, Chapter 6 has been devoted to the subject, and discussion here will be limited. Suffice it to say that all standards applied to foremen incentives should represent factors over which he can exercise control, such as downtime, scrap, overtime, supplies, maintenance and repairs. Before any savings can be put on an incentive basis, it is necessary to establish a carefully itemized budget for the foreman's department. It is in terms of these budget items that incentive goals for the foreman must be formulated.

Incentives for white-collar workers

While not so well developed nor so generally used as in the production processes, incentives for *office workers and clerks* may be developed successfully for either individual or group accomplishments, depending on the type of work involved and the size of the office organization. Although it is a generally accepted norm that personal incentives produce more effective results, the productivity of many office workers is often affected advantageously by other members of the group, thus suggesting group incentives in such cases. On the other hand, many concerns have successfully geared some office incentives to the individual, especially to operators of complicated office machines.

For the worker in the small office, most incentive standards are based on the personal judgment of someone in the general management group, especially when the workers are not organized. However, the effectiveness of even the small office force can be measured against general standards established by methods and time study, corrected to account for local conditions, or specific standards can be set up for individual offices by the same techniques when the expense appears justifiable. Infrequently, even in large offices, specific jobs may be paid a piece-work rate. However, the operator time allowances which must be accounted for are only one of the details which make it difficult to set up mutually agreeable piece-rate plans for any kind of office work.

The first step in recognition of superior performance under a general incentive plan is customarily an advance within the rate range for the classification affected.

While many *salesmen* are paid fixed salaries, incentives based on volume of sales, or commissions, are common practice. There are many refinements of detail in the various incentive plans for salesmen. For example, they may include a minimum salary, calculated to cover living expenses, with commissions starting after a fixed volume of sales. Again, the "guaranteed" salary may be charged against a commission account figured on total sales. The purpose of the guarantee is to relieve the salesman's anxiety about a minimum living standard, but it does not assure his continuance on the job.

Commissions may be figured directly on sales volume, or on a graduated scale, either up or down, in proportion to volume. It appears reasonable that progressive units of sales beyond some standard would require increased effort, and be entitled to an increasing percentage reward. However, any commission plan may occasionally yield the salesman a higher total income than the salaries paid to the concern's corporate officers, with corresponding psychological repercussions. For this reason, the salesman's total pay is sometimes limited, to circumvent jealousies in the upper pay brackets of management. Occasionally, therefore, the commission percentage is figured on a regressive scale, to accomplish the same purpose — a plan which is clearly contrary to the basic idea of incentive payments.

The salesman's expense account may offer a legitimate opportunity for indirect compensation when it is based on a fixed daily allowance. This expense plan is often substituted for the older idea of an out-of-pocket expense account because of the questionable elasticity of the latter.

How to pay salesmen for the most productive results has been the subject of perennial debate at meetings of the National Sales Executive Clubs which have never agreed on any acceptable general plan, nor indeed on patterns most suited to particular types of business.

Incentive failures

There are numerous reasons for failure of incentive plans. The following are suggestive:

1. The *personal characteristics* of the concern's management and labor leaders may suggest defeat from the beginning. This point will be developed further on in the present chapter.

2. Failure to secure complete *understanding and cooperation* of all layers of management and union officials before the plan is installed leads to suspicion based on ignorance. This is a flimsy springboard from which to launch any incentive plan.

3. *Poor standards* spell disaster, irrespective of which way they lean. If the standards are loose, premium wages will be high, and productivity may be close to the day-work pace. If the standards are tight, worker dissatisfaction will lead to accusations that management is speeding up, and the plan will be well on its way to failure, even if provision is made for challenging the rates.

4. *Ceilings on earnings* will surely lead to pegged production. If the standards are reached with comparative ease by superior workers, there is no method for preventing their restricting production to some point below the maximum they could attain. If financial rewards are the aim of incentive payments, there should be no limit within the rules.

5. *Failure to improve methods* of the worker or his tools, machines, workplace and materials before determining standard times is a fatal mistake. When management starts to make improvements after the system has been installed, there is a natural desire to have standard times adjusted accordingly. No matter how honestly the time changes are conceived, the worker has a legitimate cause for suspicion, and his confidence is correspondingly lessened. He almost invariably complains of speed-up.

6. *The premium scale must be adequate from the start.* If the scale results in low premiums for improved application by fast workers, the plan will not be acceptable. The workers will feel that someone else is getting part of the reward for their efforts, and they always have the "out" of minimum production with a guaranteed base pay.

7. *Poor scheduling of jobs,* including machine setup time, delivery of materials and an excessive number of short runs, affect the worker's opportunity to earn premium pay. No matter how good the plan is on paper, it must produce results in action.

8. *Maintenance* is another factor in the worker's ability to earn high wages under any incentive plan. Poor tools and equipment are evidence of poor maintenance. Either will kill the best incentive plan.

9. If the incentive plan is *too complicated for worker understanding,* it cannot be effective. To simplify it after complaints often makes matters worse. The employees will feel that the new plan is being used as a cover-up to tighten the rates.

10. *The plan must be tailored to the circumstances.* In general, it should include only those factors over which the workers have control. Otherwise they will tend to work the plan to their own interests after they discover its loopholes. Their interests must be tied in with company interests to obtain good results.

These reasons for failure suggest basic principles which must be made explicit to all incentive workers:

1. The base hourly rate will be paid regardless of production.
2. Standard times will not be altered except for an important change in methods, machines or materials.
3. Premium pay will be proportionate to production above the standards.
4. There will be no limit on incentive earnings.
5. Any standard will be subject to the grievance procedure.

Along with these basic principles there must be a workable incentive plan. It is not necessary to have the same plan in all departments. Individual incentives are preferred where they can be used. Where the group plan is necessary and feasible, the number in the group should be kept as small as possible.

Too often management feels that it can sit back and watch production increase after installation of the plan. The items listed here as causes of failure must be guarded against in an active and constructive manner. There are three important activities under the control of management in this connection:

1. Provision must be made for a *continuous methods-improvement program.* There never was a plan which could not be improved. When changes are significant enough to affect the worker's production, he should be allowed to share in the advantages. This policy will insure worker cooperation in helping with further improvements.
2. *Competent time-study operators* create confidence, and conversely, distrust is engendered when they are not competent. Workers soon separate the wheat from the chaff. The company which hires a boy just out of high school and gives him the title of "time-study man" is not fooling the workers.
3. It is sometimes advisable to use *standard data,* which can be established within the shop, or secured from outside sources. Such data can be applied to the same work elements in different repetitive operations.

The limitations of incentive-wage plans

So far we have been talking about systems of incentive wages as if they could be used in any work situation. It is true that new applications of the incentive idea are continually being discovered, and yet the proportion of workers covered by incentive-wage plans in American industry as a whole has remained rather constant since World War II, and there are some indications that the percentage has declined since the middle thirties.[6]

There are limiting conditions to the continued expansion of the use of incentive wages. Six of these merit discussion.

1. *Size of establishment.* In small concerns, where because of the nature of the process piece rates are not possible, but where standard times conceivably could be applied, it often happens that the cost of time and motion studies and of the record-keeping that standard-time plans involve makes the use of incentives too expensive to be profitable.
2. *Technological change.* In industries which are undergoing rapid technological advance, there is a constant need for retiming of operations or for setting new piece rates. Although the problem has been circumvented in some industries — notably in the manufacture of apparel — such instability often makes it advisable to pay day wages, at least during the foreseeable period of machine and process changes.
3. *Mechanization.* The clothing industry, in which nearly all workers are

---

[6] The two chief sources of information on trends in the over-all prevalence of wage-payment plans are surveys made by the National Industrial Conference Board and the U. S. Bureau of Labor Statistics. In 1924 and again in 1935, the NICB found that about 40 per cent of plant workers in manufacturing industries were paid by incentive wages. (*Financial Incentives,* National Industrial Conference Board Studies No. 217, 1935.) In the samples studied more recently by the BLS, it was found that about 30 per cent of manufacturing plant workers were covered by incentives in 1945–1946, and that this proportion had not changed in 1951–1952. (Joseph M. Sherman, "Incentive Pay in American Industry, 1945–1946," *Monthly Labor Review,* Vol. 65, November 1947, pp. 535–538; and Otto Hollberg, "Wage Formalization in Major Labor Markets, 1951–1952," *Monthly Labor Review,* Vol. 76, January 1953, pp. 22–26.)

paid piece rates, exemplifies the kind of work which lends itself most readily to incentive plans, because here the typical worker: (a) performs a series of repetitive, easily measured operations; and (b) the quality and quantity of output depend almost entirely on the skill of the operator. However, in industries where the rate of output is fixed by the invariant speed of machines, it is hard to find a basis for establishing individual, or even group, incentives. Because the degree of mechanization of industry is advancing every year, it is not surprising that the proportion of direct production workers under incentive plans should not be rising. For example, coal miners have traditionally been paid on a tonnage basis, but with the increase of mechanization in recent years, and the consequent lack of individual worker control over his level of output, there has had to be a shift away from incentive to day wages.

4. *Functional diffuseness.* Particularly among the highly skilled trades, a worker is often called upon to perform a variety of different tasks in a day or a week, and not infrequently each job will constitute a unique pattern of operations. When the work is too diffuse, it would be uneconomical, if not practically impossible, to establish standard times as a basis for incentive pay.

5. *Quality versus quantity.* It has often been argued that where quality of output is more important than quantity, day work is preferable to incentives. The crux of the argument is that in the effort to maximize output under incentive plans, quality is likely to suffer. However, there is little evidence in support of the alternative view that quality automatically increases under day work. Furthermore, under such plans as Multiple Factor Measurement, quality is one of the factors on which incentive wages are based. Thus, though the quality–quantity argument has been traditionally advanced against the use of incentives, the question is at least debatable.

6. *The attitude of labor.* With the growth of organized labor, the official union policies on incentive wages must be considered by any management which is planning to change over from day wages to some incentive system. There are many instances where all the conditions for a successful incentive plan have obtained, but where opposition from the union has prevented the adoption of such a plan. Incentive wages might very well be applied generally to the printing industry, for example, but in practice, because of union opposition, they have been applied only to unorganized workers. Another example is the automobile industry, where piece-work, group-bonus and other incentive systems once prevailed. Since 1934, most of these plans have gradually given way to straight hourly rates because of successful union resistance. Among automobile manufactureres today, only Studebaker and Willys-Overland have retained incentive wages as a common method of remuneration.

Since the reactions of organized labor are such an important consideration in the use or abandonment of incentive systems, it will be appropriate to conclude this discussion with a brief survey of labor's current attitudes.

Labor's attitude toward incentive wages

The Locale of Incentive Wages. In the study already cited of forty major labor-market areas in the United States in 1951–1952, the U. S. Bureau of Labor Statistics found that roughly 30 per cent of the plant workers in manufacturing industries were paid by incentive wages. No significant number of office or plant workers in nonmanufacturing concerns were covered by incentives. Various commission plans are common among salesmen in both wholesale and retail trade, and these plans fit our definition of incentive wages. Of the incentive workers in manufacturing industries, slightly over half are paid on a straight piece-work basis, and the rest by some form of standard-time plan. "Plans with complicated formulas for computing payments are somewhat less common today than some years ago. The same is true of plans in which the premium payments are less than proportionate to the output above the standard."[7]

Piece Work Today. In view of what we have said about the disadvantages of straight piece work, it may seem rather surprising that piece work still predominates over standard-time plans. But if we look at the original objection to piece work, we shall see that much of the basis for opposition has been removed in the last few decades. Three major complaints about piece work were listed: (1) the arbitrary way in which piece rates were continually reset; (2) the absence of any plan for remunerating the worker during work stoppages which were beyond his control; and (3) labor's distrust of management's sincerity in applying the principle of "extra pay for extra output." We have already seen how the introduction of standard-time plans attempted to resolve these difficulties. Now let us see what has happened in the piece-rate industries.

A major reason why piece work has become more acceptable — especially in the apparel industries, where almost all workers are on piece rates — is that the unions have come to play an active role in the determination of the rates. A persistent problem in the manufacture of clothing is that the continual introduction of new styles and new materials makes for a great deal of fluctuation in the rate of individual output, and hence there is a necessity for resetting the rates very often.

> In the women's garment industry, the New York Dress Joint Board representing the various craft locals of the International Ladies' Garment Workers' Union has developed a "unit system" of price settlement and price lists for standard operations in the various price ranges as yardsticks to guide actual price making. These yardsticks were drawn up by the union, using time-study procedures, but are only informally observed in price settlement. Each craft working under each employer usually has its own price committee which meets with him as often as necessary to settle individual prices. If agreement

---

[7] Herbert S. Briggs, *Wage Payment Systems* (New York: National Industrial Conference Board, Studies in Personnel Policy No. 91, 1948), p. 3.

> is not reached in this way, the business agent of the craft concerned is called in; if the deadlock continues the case is taken to the Price Adjustment Bureau for impartial decision.[8]

City-wide price lists for each operation have also been arrived at collectively by labor and management in the Massachusetts shoe industry. In textiles, another piece-rate industry, the problem is not new styles and materials, but rather the introduction of new methods and new types of machinery.

> In some textile plants a piece rate is adjusted only at the time a change is made in the work assignment or loom load. This in turn accompanies either a major change in equipment or the accumulation of many minor changes which causes the employer to ask for larger work loads. This may arise only once or twice in many years of negotiations between the employer and the union. . . . In this industry, the union has asked for, and in many cases received, the right to participate in all work-load changes before they become effective. Negotiations for such major changes are often protracted. They may be accompanied by independent research on the part of the union as to work loads on similar equipment in other plants; time studies of the new operations by the union, independent of the employer; trial periods as long as 3 months; and, finally, if a deadlock ensues, arbitration.[9]

The problem of remuneration for unavoidable downtime has also been removed for most piece workers. In some cases, employers have voluntarily agreed on a certain base rate to be paid in the event of production delays. (This practice, as we have seen, is very common under standard-time plans.) But more important in solving the problem of downtime for piece workers was the passage, in 1938, of the federal Fair Labor Standards Act, which guaranteed a minimum wage for all employees working a full week for any firm engaged in interstate commerce. At the time the bill was passed, it was primarily the piece-rate industries — apparel, textiles, leather, cigars — that were paying substandard weekly wages. Because these industries fell almost entirely within the scope of the Act, minimum wages are assured the great majority of piece workers, who now share with standard-time workers a base pay plus "extra pay for extra output."

Although it is harder to document, much progress has been made toward the resolution of the third problem — the demonstration that most employers are sincere in their claim that piece work is for the mutual benefit of owners and employees. Employers' willingness to bargain collectively with the unions in establishing rates is gradually increasing. Evidence that workers are able to appreciate incentive-wage problems from the employer's point of view is the fact that in some industries — notably, the shoe factories — the local unions have sometimes offered lower-than-average piece rates to individual employers who need additional encouragement to stay in business in the particular locality.[10]

---

[8] *Incentive-Wage Plans and Collective Bargaining* (U. S. Bureau of Labor Statistics, Bulletin 717, 1942), p. 10.

[9] *Ibid.*, pp. 11–12.

[10] *Ibid.*, p. 11.

Because of these improvements in the piece-work system, it may not be an exaggeration to say that labor today tends to prefer piece work to other kinds of incentive plans. This is not surprising, since as we have already pointed out, workers like a plan which enables them to calculate their pay by themselves, and because the standard-time plans invariably offer computational difficulties. Furthermore, scientific motion and time studies create in the workers a distrust which is none the less real for being usually unjustified by the circumstances.

The rough generalization of the preceding paragraph may be carried one step further: labor tends to prefer piece work to standard-time plans, and to prefer day wages to either incentive system. Again, there are important exceptions. For at least two reasons, the apparel workers are usually satisfied with piece work. Through long tradition, they have come to expect that pay will vary with output, and when attempts have been made to put the clothing industries on a day-work basis, the workers themselves have objected. Second, the manufacture of clothing is highly seasonal, and the skilled piece worker wants to be able to make extra pay at the height of the season as a backlog against the foreseeable lean days.

There are other exceptions to our generalization. In the flat-glass industry, for example, after initial attempts to get the owners to abolish incentives had failed, the union leaders became active supporters of the system, feeling that the wisest policy, if they had to live with incentives at all, was to make that system work as well as possible. These union leaders were instrumental in extending incentive wages to many kinds of workers who had not previously been covered by the plan.

Nevertheless, despite these examples of favorable union attitudes, the fact remains that in all the major industries where incentive plans are widespread today, they were in existence before the workers were organized into unions. Management has had no significant success in introducing incentives into an already organized plant, and in the automobile industry, as we have seen, a preexisting incentive system was abolished, once the industry was organized.

Incentives and Union Philosophy. It is legitimate to ask whether the union leaders who oppose incentives are really speaking for the rank-and-file membership. Perhaps the question is unanswerable. Certainly there have been instances where union locals have voted in favor of incentives when the national leadership was on record against them. At the same time, it is logical to assume that national unions could not maintain their strength and continue to grow if, on the whole, they did not reflect the sentiments of the rank and file, and there are many flourishing national unions today which have followed a consistent policy of opposition to incentive wages in all forms.

The philosophy on which incentive wages are based raises a serious question in the minds of trade unionists. On the one hand, the unions want each worker to receive as high a wage as possible, and it is a matter of simple observation that in industries where some workers are on day wages, while others, performing the same operations, are paid by an incentive system, the average earnings of the incentive workers are almost always higher. On the other hand, there is a strong element of equalitarianism in union philosophy, which says, in effect, that workers are all in the same boat and that the boat will eventually sink unless everybody pulls together. The desire to preserve solidarity among the workers, and the conviction that this solidarity must be actively fostered by the union leadership, have unquestionably been a major source of labor's general hostility to incentives. The solidarity of the union is threatened when personal frictions arise among members who, under an individual incentive-wage plan, are inevitably competing with one another.[11]

Against this union philosophy the argument is frequently raised that every worker has a normal desire to be rewarded for individual meritorious performance, and a natural resentment when he is not rewarded or when he sees others receiving the same pay as himself when he knows that they have not worked nearly so hard. The argument maintains, in brief, that wherever there is an obvious disparity between effort and remuneration, the worker's motivation to produce is lowered. That there is much psychological truth in this line of reasoning can be seen from the experience of the Soviet Union. After the Russian Revolution, the desire was strong to base wage-payment methods on Marx's communist ideal: "From each according to his ability, to each according to his need." A feeling of equalitarianism pervaded the Soviet Trade Union Congress of 1919; nevertheless, the Congress, recognizing the industrial backwardness of the country, was forced to declare that "the wage law must be posited on a system of remuneration of labor which incites the . . . workers . . . to increase productivity in the nationalized plants, that is, on a piece and premium system, constructed on the basis of fixed norms of production." [12] Wage differentials have continued to be the rule in the Soviet Union and today the last half of Marx's slogan is given as: ". . . to each according to his *work*."

Perhaps it is a mistake to speak of labor's "attitude" toward incentives, for there is not one, but a multiplicity of attitudes on the subject.[13] What should stand out from the foregoing discussion is that the question of the workers' and the unions' attitude toward incentive plans is an important and sometimes decisive consideration in management's deliberations about what wage plan to adopt.

---

[11] Van Dusen Kennedy, *Union Policy and Incentive Wage Methods* (New York: Columbia University Press, 1945), p. 64, cites a union official in the leather industry as saying: "The chief function of the union is to protect the men from themselves."

[12] Cited in Abram Bergson, *The Structure of Soviet Wages* (Cambridge, Mass.: Harvard University Press, 1944), p. 195.

[13] Kennedy, *op. cit.*, shows from the evidence of personal interviews with union members and leaders that labor's "attitude" toward incentives is a complicated web of many attitudes, sometimes logical, often irrational and even mutually contradictory.

Day Work and its Variations

Despite the growth of the various incentive-wage plans during the past century, the straight time wage still remains the chief method of remunerating workers, both manual and white-collar, in every branch of business. In many cases, especially for manual workers in the manufacturing and service industries, the method of day-wage payment is much the same today as it was in the early days of the industrial era. Nevertheless, just as the objections of labor have gradually forced the introduction of straight-time base rates into the original piece-work system, so too the objections of management to the low productivity characteristic of day wages have been bringing about modifications in the original single-rate system of day work, and these modifications have been in the direction of adding incentive pay to the time wage. One such modification, known as "measured day work," was tried out with some success by the automobile manufacturers, after union pressure had forced the abandonment of incentive wages as such.

Measured day work

Measured day work, which adds premium pay for desirable worker attributes to a scientifically determined base rate, attained prominence during the depression of the thirties. It is an anomaly, as its name implies. Its purpose is to inject incentives into day work without using the word "incentive." Like full-fledged incentive plans, it aims to overcome the workers' practice of gearing their output to the capacity or desire of the below-average worker. It offers an opportunity to the "fireball" to act natural without being blackballed by his fellow workers. To the extent that it accomplishes these purposes, it is a good transition plan between the standard day rate and one of the numerous incentive plans.

Measured day work fixes the take-home pay within the rate range, of which the base rate is the minimum. The amount of pay above the base rate is influenced by such factors as productivity, quality, dependability and versatility. Because the two main features of this plan are scientific determination of base rates and measurement of selected worker characteristics, the plan is actually a combination of job evaluation and merit rating, both of which will be discussed later.

Obviously, measurement of worker characteristics requires more paper work than the straight day-work plan, but it is simpler than most incentive plans. Also, the inducement factors are capable of fairly accurate measurement. *Productivity* is known from the worker's daily production record; *quality* is measured by the number of his rejects; *dependability* is determined by his attendance record; and *versatility* depends on the number of different jobs he is capable of performing.

The worker is rated periodically on the factors mentioned, to determine his inducement pay, which is in addition to his base rate. New workers are usually rated monthly; others, every three months. In no case does the worker receive less than his base rate, so measured day work offers the possibility only of increased take-home pay, never a decrease. Of course, the base rate may be raised or lowered by negotiated agreement between labor and management.

Because the base rate may be changed without affecting the inducements of the measured day rate, and because better performance can be obtained from the worker without the incentive "stigma," this plan is popular with management, especially where the union will not agree to any form of incentive pay. It is well liked by many workers, too, because it provides rewards for superior performance.

The disadvantages of the plan are the time lapse between performance and the time of fixing the rate of reward, and the possibility of disagreement over the weighting of the factors. Weighting necessarily involves some personal foreman opinion. To the extent that foremen determine the rewards, there is a tendency to take the easy way and rate the workers high to avoid their criticism.

Rate ranges

A variation of straight time wages used more widely than measured day work is the rate range. Under this system a range of rates is established for each job classification. The methods of classifying each job and of establishing the top and bottom rates for each classification have received much scientific attention in recent years. They form the subject matter of the following chapter and therefore we shall not attempt to describe them here. What concerns us most in the present context are the methods by which a worker progresses through the rate range for his particular classification.

Both single rates and rate ranges, as we shall use the terms, refer to wage rates for *experienced* workers. In both cases, a complete and separate rate structure below the minimum rate for experienced workers is usually established for learners and apprentices, who are not yet fully qualified for the given job classification. There are two basic criteria for progression through the rate range, once a worker has qualified: *seniority* and *merit.* Labor tends to prefer seniority, or length of service, as the criterion for advancement to a higher rate. Management, on the other hand, would rather base promotion on some measure of the worker's value to production. A compromise which has been worked out in some concerns is to advance the worker through the first half of the range at regular intervals solely on the basis of length of employment, but to restrict advancement beyond the midpoint of the range to workers who have demonstrated their worth to the company as measured by such factors as quantity and quality of output, regular attendance, effort, initiative and so on.

The techniques of evaluating a worker for such progression through the rate range are known as "merit" or "service" rating. Because Chapter 27 is devoted to a discussion of these techniques, only a few aspects of service rating need be treated here. The question immediately arises: what is the difference between incentive-wage plans and rate-range plans with merit-rating criteria for advancement? We have defined an incentive-wage plan as one in which the worker's earnings vary more or less directly with his output. While it is true that some rate-range plans fit this definition, most of them do not. Progression through the range is typically a one-way passage: the employee can receive a higher rate when his level of output rises, but if there is a falling off in his productivity, his pay is not correspondingly decreased, and the only way in which he is financially penalized is by halting his further progression through the range. (Of course, if there is a really drastic decline in his output, he runs the risk of being fired altogether, but this is equally true of the ordinary day worker, paid by a single rate, and cannot be thought of as part of an incentive pay system as we are using that term.) The minority of rate-range plans in which a low service rating brings an automatic decrease in the worker's hourly rate are similar in many ways to measured day work; and, as incentive plans, they share with measured day work the disadvantage of relative infrequency of rating, which makes the interval between a worker's performance and his reward or penalty so protracted that the psychological incentive effect is somewhat blunted.

Random rates

A brief note is in order about methods of wage payment known as "random" or "individual" rates. Actually, these methods are not wage *plans* at all, but might better be referred to as "wage payments in the absence of any formal plan." Such individual rates are commonly set on the basis of the employer's personal judgment of a worker's training and ability; often the employee's personality and his bargaining power have a lot to do with the rate which is finally arrived at. Individual rates are found mostly in very small plants and businesses. But the vast majority of workers in America are paid by one of the formal time or incentive plans which have been described in this chapter.

Table 25.1, compiled from survey data of the Bureau of Labor Statistics, gives some idea of the distribution on the current American scene of the various plans which have been discussed. It will be noticed that the ratio of time to incentive workers varies a great deal by labor-market area. The low proportion of incentive workers in Detroit, for example, reflects the abandonment of incentives by the automobile industry, just as the high proportion of both piece-work and standard-time workers in Milwaukee reflects the widespread use of incentives in Wisconsin's metal-working industries. The relatively high proportion of piece workers in New York is accounted for by the concentration there of the clothing industry.

The data in Table 25.1 are confined to manual workers in the manufacturing industries. If comparable data were available for business and industry as a whole, the table would be quite different. Incentive wages have yet to

TABLE 25.1

Percentage of Plant Workers Paid by Various Wage Plans in Manufacturing Industries in 17 Major Labor-Market Areas, 1953–1954

	TYPE OF WAGE PLAN						
	TIME PLANS				INCENTIVE PLANS		
AREA	Single Rate	Rate Range	No Formal Plan	Total Time Plans	Piece Work	Bonus	Total Incentive Plans
NORTHEAST							
Boston	24	37	4	65	18	17	35
Newark–Jersey City	35	29	3	67	15	18	33
New York City	29	22	19	70	22	8	30
Philadelphia	35	21	6	62	22	16	38
SOUTH							
Atlanta	34	36	7	77	19	4	23
Dallas	18	57	15	90	7	2	9
Memphis	36	29	12	77	20	3	23
New Orleans	58	13	9	80	11	3	14
MIDDLE WEST							
Chicago	24	37	7	68	15	17	32
Detroit	78	10	3	91	4	5	9
Milwaukee	27	29	3	59	19	22	41
Minneapolis–St. Paul	37	42	4	83	9	8	17
St. Louis	40	33	1	74	14	12	26
FAR WEST							
Denver	42	26	4	72	20	8	28
Los Angeles	32	52	2	86	8	6	14
Portland	82	5	2	89	7	3	10
San Francisco–Oakland	87	3	–	90	6	3	9

Source: U. S. Bureau of Labor Statistics, Bulletin No. 1173 (1955), Tables 8 and 10, pp. 31 and 33. Some of the rows do not add to 100 per cent because of rounding off in the original tables.

make serious inroads outside of manufacturing, while rate ranges tend to be much more common in the various nonmanufacturing industries. One thing stands out clearly in Table 1 — in all but three of the areas studied, the proportion of workers who are not covered by *some formal wage plan* is insignificant.

Executive Salaries

Executives, like the prophets, may be divided into the major and the minor. There is a distinct difference in salary ranges for the two groups, and the techniques for evaluating members of the two groups also differ.

Minor executives may be in charge of production departments, sections of sales, purchasing or some other activity where supervisory results can be measured with a fair amount of precision. They are paid on a salary basis, with or without bonuses or other forms of incentive pay. There is still much trial and error in working out bonus plans for this group. If the bonus is related to sales or profits, its computation is simple, even if the plan proves defective in being either too liberal or too parsimonious. When bonuses are based on meeting budget estimates, then savings in materials, indirect labor and maintenance present many detailed problems. Standards must be set for each control factor, and then all of them must be weighted to establish their relative importance. This type of bonus payment is not uncommon on the supervisory level; it is less common but still prevalent among minor executives on the departmental level.

The major executive level presents an entirely different problem, because generally accepted standards are lacking. Some thoughtful opinion sets a top limit to the reasonable earnings of executives. Many executives have a similar perspective on what should be considered reasonable top earnings for those who work with their hands. Some others contend that any executive is "worth what he can get," which is a rather blunt way of expressing the idea, even if the reasoning is sound. It is also contended that executives should be paid according to the number of employees over whom they have general supervision. This criterion would make some top military leaders almost priceless. Volume of sales is another criterion, and profits have considerable prestige as a standard, provided that operating losses do not exercise a reverse effect on the salary level. Stockholders often complain when top executives are paid large salaries while they are actually losing money for the company through mismanagement.

The National Industrial Conference Board issued a report[14] comparing executive salaries in 1940 and 1949, and relating both to percentage of sales. The average salary increase for the ten-year period was about 75 per cent, while the cost of living jumped 60 per cent. Increase in income tax and cost of living left many executives in a worse position at the end of the period than at the beginning. In many companies the salary of the top executive is much more than double his take-home pay. When large bonuses are paid in cash, the total of pay and bonus may place the executive's income in a higher bracket, where the graduated income-tax rate has the effect of washing out any absolute gain in income; in such cases the bonus is not much of an incentive. It is because of the increasing tax load that many top executives receive their bonuses in some form of deferred payment. Distribution of company stock as part of the salary is one plan. Company contribution to life and retirement insurance is another. There are numerous plans providing for deferred payments through variously styled "funds."

[14] *Trends in Executive Compensation* (Studies in Labor Statistics No. 6, 1951).

Bonuses

The premiums or "bonuses" paid under standard-time systems are an integral part of the wage plan. These should not be confused with the more common type of bonus which is not, strictly speaking, a part of the wage or salary at all, but is more in the nature of a gift or an occasional reward for meritorious service. Bonuses paid to executives are usually of this nature, and similar bonuses are often paid to all levels of employees, from the executive down to the unskilled worker. Such bonuses act as incentives and, in some cases, are granted so regularly by the company that the employee comes to expect them as part of his remuneration. Nevertheless, they should be thought of as independent of the wage or salary.

Each bonus of this type is likely to have a specific purpose. The *length of service* bonus is given to cut down labor turnover. *Safety-record* bonuses often have a marked influence on the accident rate. The *foreman* bonus is sometime figured on a percentage of his annual pay. The *profit* bonus is often based on total wages rather than any scientifically determined plan.

The *production* bonus is related to output. The Kaiser-Frazer production bonus of five dollars on each car is based on the man-hours worked. To be eligible, workers must be on the job 90 per cent of the working time. This has the dual purpose of increasing production and reducing absenteeism. The *savings* bonus is paid for reducing costs of various kinds, such as scrap. It is usually paid to foremen, although many types of savings bonuses are distributed directly to workers.

In the payment of bonuses, management must be careful to avoid tax pitfalls. The question is whether the bonus is for compensation or is a gift of some kind. If it is for service, it may be charged to expense, and the employee pays the income tax on it. If it is a gift, the company must pay the tax.[15]

Like other forms of incentives, the bonus must fit the situation where it is to be applied. R. H. Macy & Company, the nation's largest department store, discontinued its bonus plan for department buyers in 1950 after ten years operation. This is significant because the plan had been in effect for so many years, and because bonuses for buyers have been the norm with department stores. In this case, it was a "situation fault" that caused the change. Macy's management decided that bonuses for buyers tended to make them feel that their departments were autonomous. It was explained that while bonuses encouraged the departments, they hurt the store.[16]

---

[15] See "Xmas Bonus: Gift or Compensation?" *Business Week,* No. 1109 (December 2, 1950), pp. 57–58.

[16] "Exit Bonus for Macy Buyers," *Business Week,* No. 1069 (February 25, 1950), pp. 40–44.

Conclusions

The history of the development of the formal wage plans in use in business and industry today has been presented in terms of the conflict between day work, with its encouragement of mediocrity, and piece work, with its emphasis on the incentive to produce. The attempt has been made to demonstrate that neither system, in its original simplicity, is entirely satisfactory either for management or for labor. The twentieth century has witnessed a gradual convergence of what once seemed to be irreconcilable approaches to the problem of what should constitute "a fair day's pay for a fair day's work." The scientific techniques of time and motion study, as well as the new cooperation of management and labor in setting rates, have virtually eliminated the arbitrary practices which quite justifiably made the nineteenth-century worker rebel against the idea of incentives. Large sections of organized labor may still continue in their opposition to incentive wages, but it cannot be said that management has not tried hard to correct the abuses to which labor originally objected. Finally, that the incentive principle is still flourishing and even extending itself beyond its original habitat of piece-work and standard-time plans can be seen from its recent embodiment in the merit-rating systems for determining promotion under rate-range plans.

QUESTIONS

1. What are the two basic methods of wage payment?
2. What is the relation between "farmed-out" home work and the development of piece-work wages?
3. What is the chief advantage and chief disadvantage of day work as a wage plan?
4. How did employee objections to piece work first arise?
5. Explain labor's three outstanding objections to incentive wages.
6. What chief difficulty may develop from the use of incentive plans without prior refinement of methods, tools and machines, as well as the workplace?
7. Why does the standard-time wage plan provide more flexibility than the piece-work plan?
8. Who was chiefly responsible for the development of "task times" and how were they determined?
9. Premiums under the Emerson Efficiency Bonus Plan are figured for pay periods rather than for each operation. Is this an advantage for the worker or the employer, and why?
10. Why has Taylor's "Differential Piece-Rate Plan" received scant attention in practice?
11. What is meant by the "guaranteed wage" in association with some of the incentive plans?
12. MFM contends that incentive jobs should isolate those elements which are

under the control of the workers. What is the purpose of measuring and weighting such elements?

13. What are the prime requisites for the success of group incentives?
14. How can indirect workers be rewarded on an incentive basis? Give an example.
15. Outline your idea of a workable incentive wage plan for a foreman in a hosiery mill.
16. Name some of the outstanding causes for incentive failures. What would you suggest for their correction?
17. What limitations would you suggest to the expanded use of incentive wages?
18. Summarize labor's attitude toward incentive wages.
19. How does measured day work make use of the incentive idea without using its techniques? What is the chief advantage?
20. What is the relation of the "rate range" to incentives?
21. What is meant by "random" or "individual" wage rates?
22. How would you establish an incentive salary plan for top executives? What important factors would influence your plan?
23. Explain some of the bonuses other than those paid under standard-time systems.

CASE PROBLEM

Powdered Metal Products

Powdered Metal Products makes metal parts from powdered materials of various kinds, including most of the metals. The main processes are die-making, high-pressure press operations, sintering (heating to secure hardness) and subsequent cold pressing to meet the usual close tolerances required in the specifications.

It is customary to mix various powders or grains to obtain the characteristics required by the use to which the finished parts are applied. This phase of the manufacturing process demands unusual skill and experience. The basic mixtures are determined by metallurgists, but experienced supervisors also experiment with new mixtures or alloys, occasionally with marked success. The degree of success is determined by the performance of the finished parts in the customers' operations. These mixtures, or formulas, are recorded for possible future use if they are satisfactory. The formulas are company property, and it has not been customary to give specific credit of any kind to the person directly responsible for their composition.

The dies, which consist of a hollow cylinder, enclosing top and bottom close-fitting pistons, must not only be extremely accurate, but their dimensions must make allowance for the expansion or contraction of the powder mixture used. This part of the work is made more difficult because of the different expansions or contractions of the powder mixtures used in most of the processes. A first-rate tool-maker must have special training and long experience to make a difficult die. The dies are expensive, and mistakes are costly.

The sintering process also offers many opportunities for failure in the final product. The degree of heat maintained in the furnaces and the heating period are both extremely important. Either factor can spoil the entire furnace load, which has no reclamation value.

Expensive waste can, therefore, happen with any one of the three important processes. The volume of production is fairly well determined by the speed of the presses and the capacity of the furnaces. However, maximum productivity can be obtained only by fast and careful workers, who must be closely supervised. The press hoppers must be kept filled with the powdered grains, and the pressed parts removed at set periods for transfer to the furnaces; otherwise they may be broken in the transporting trays because they are relatively soft as they come from the presses before sintering. The interval between unloading and reloading the furnaces is also an important factor in the productivity of that process.

It is not unusual to have to rework new dies. This may be done by inserting a sleeve where the main bore has been made too large, or some other of many correcting methods developed by the die-makers. As has been mentioned, die-making is expensive under the best of circumstances, but costs are often increased when corrections are necessary. These faults are not caused so much by poor workmanship as by failure to make proper expansion and contraction allowances for the powder mixtures used in the presses. The superintendents of the die department shoulder this exacting responsibility. Well-made dies can be used for long runs and for repeat orders, but eventually they become so worn that they must be retooled. This operation often demands a higher skill than the making of the original die.

Powdered Metal Products has been in operation for twenty-five years. Although the process of making powdered metal parts is not new, its commercial use is not much older than the company. This situation necessarily made progress slow from the standpoint of profits. It would have been difficult, if not impossible, to set up a supervisory bonus plan until recently because of losses due to the several exacting processes already described.

The company installed an incentive plan for most of its production workers two years ago, and it has given general satisfaction. Its supervisory employees, of whom there are twenty-two, have been with the concern for an average of fifteen years, and it is felt that in fairness to them their services should be geared to some kind of bonus plan. Top management also feels that the company will benefit, judging by the results obtained from its worker incentive plan.

PROBLEM. If you are called on to devise a bonus plan for Powdered Metal Products' supervisors, on what factor or factors would you base it? Would you favor savings of materials, product losses, or productivity? Would you consider a profit-sharing plan, or the degree to which the foremen met or bettered their department's budget? Would you pay the bonus in cash or company stock? How would you determine the standards on which your bonus factors are based? On what time period would you figure the bonus? Would you penalize those foremen whose departments failed to meet the standards you set up? How would you reward supervisors whose improvements of methods or processes have meant sizable savings to the company?

CHAPTER 26 Job Evaluation

In the days of the craft guilds, wage structures posed few problems. The rate at which journeymen were paid, and the progressive rates of apprentices while they were learning their craft, were fixed by the rules of the guild. Since the lowliest apprentice would one day acquire all the skills of the journeyman, the question of different rates of pay for different areas of specialization did not arise. The stability of this system was undermined by the shift to mass production. When the factory worker was expected to know only one or, at the most, a few of the skills required to put out the finished product, it was inevitable that workers with different kinds of ability should begin to receive differing rates of pay.

There were other factors, too, which favored the development of a differential wage structure. When industry moved out from under the master's roof and began to expand in size and in the nature of the work done, differences in working conditions became ever more prominent. The Industrial Revolution gave birth to types of work, like foundry and steel-mill operations, which were necessarily performed under poor, and even dangerous, working conditions. Furthermore, even under the guild system, differences in the degree of training and responsibility were differentially rewarded. This was part of the structure of the progression from apprentice to master craftsman. When the system of apprenticeship began to give way to the new social relations of mass production, the problem of rewarding workers for varying degrees of training and assigned responsibility remained, but there was no longer a single pattern of differential wages upon which everyone might agree.

Today, as industry has stepped up its demands for higher quality and increased productivity, other differences have developed among the workers. Some men work faster than others, and some make a higher quality product, with fewer rejects. With the development of accurate records of individual output and quality, employees are able to compare the results of their efforts with those of their fellow workers. Unless wage scales for the various skills, and for different workers within the same skill, are set on a fair comparative basis, discontent develops, and with it comes lowered morale and lowered productivity. The worker group as a whole demands wages comparable to the rates paid other workers of equal ability and responsibility. These group and individual demands have resulted in an attempt to rate both jobs and workers on a scientific basis. The former is referred to as job evaluation and the latter as *service* or *merit rating.*

Wage inequality

Wage-rate inequities produce low worker morale, and this, in turn, results in increased unit costs and defective production. They also contribute to absenteeism and labor turnover. The chief causes for wage inequities are:

1. Improper job classifications
2. Different wage rates for the same type of work
3. Favoritism by some representative of management
4. Improper appreciation of job content

Evaluation of jobs by any objective method tends to relieve the pressure created by these inequities. As one writer expressed it:

> Job evaluation is just a new and popular name for a technique that actually, if unconsciously, has been practiced ever since man worked for hire. Both employees and employers have always evaluated jobs in some manner, and modernized evaluation simply represents a formalized approach to a problem handled in the past by rule of thumb. [1]

Job evaluation is not yet scientific in the proper sense of that word. It still involves opinions, even though standardized. But it serves an important phase of modern industrial relations by its systematic plan for intelligently estimating the relative values of a group of jobs. It is definitely demanded by the evolution of the management approach to human relations.

Definitions

Job evaluation, or job rating as it is frequently called, is a comparative appraisal of work classifications, irrespective of the workers involved. Two important ideas are often confused with this subject, but neither is a part of job evaluation *per se.* One refers to the worker and the other to the wage or salary rate. It is important to remember that only the job is evaluated — not the worker on the job. Also, job evaluation merely determines the *relative importance* of a group of jobs or classifications — not their wage rates. With the scale of job importance set up, it is a simple calculation to fix the wage or salary rates of the various jobs, after the top and bottom rates have been decided by negotiation with organized labor, or by some other method.

Service rating, which will be discussed in the next chapter, is the appraisal of the attitudes, performance and other personal characteristics of the worker on his job. It is clear from the definitions of job evaluation and service rating that these two procedures are closely associated. Both represent important phases of wage and salary administration. Combined, they are the best known approach for determining the individual employee's wage or salary on an equitable basis.

---

[1] Philip W. Jones, *Practical Job Evaluation* (New York: John Wiley & Sons, 1948), p. x.

Job analysis is the first step in a job evaluation. It describes the content of the job in detail. After analysis, all the essential features of the job are set forth in a *job description.* Finally, the *job specifications* state the physical, mental and other requirements that the worker must have to perform satisfactorily. Examples of job analysis and job description are shown in Figure 20.2 and 20.3 in Chapter 20.

Job-Evaluation Plans

Different approaches to the problem of wage inequities have produced different plans for its solution. An evolution in evaluating jobs was natural as various companies sought to correct their wage difficulties on an independent basis. As they continued to refine their techniques, they started to borrow from each other to a large extent. Then the professionals began to compare methods and results, leading to further scientific experimenting in this field. Already many mixtures of accepted plans are recognizable. It is not unreasonable to assume that as the experimenting progresses, we may expect a more generally accepted single plan to evolve, combining the best techniques of all of them.

The four basic plans of job evaluation are known as Classification, Job Ranking, Factor Comparison, and the Point System. Each of these will be described and evaluated.

The Classification Plan

Classification was the first plan for eliminating wage and salary inequities. Irrespective of its comparatively simple procedure and early crude applications, the record shows that it helped keep down employee complaints concerning wage irregularities. This plan is still used by state and federal civil service commissions, where it was first adopted. Industry has never made general use of the plan and is giving decreasing attention to it as a method of job rating.

The procedure starts with a series of standard "classifications," or groups, which are based largely on experience. They often require refinements to take care of changes in job content. The classifications are differentiated by relatively simple work descriptions which are generally recognized as acceptable to both management and the workers. With these classifications or labor grades established, all jobs are assigned to one of the groups. Each classification, or group, has its fixed minimum and maximum wage rate, within which there may be one or more rate steps. Figure 26.1 is an example of general descriptions of two cost-accounting jobs — cost clerk and cost

FIGURE 26.1

Job Descriptions

RELATED EXPERIENCE	OCCUPATION	DESCRIPTION	NO. EMP.		SALARY RATES			AVERAGE LENGTH SERVICE
			M.	W.	Max.	Min.	Avg.	
		ACCOUNTING—COST						
3 to 5 Years	Cost Clerk E-4	Sr. Compile complete factory cost of assemblies or finished products, from specifications, bills of material, requisitions and time cards, without detailed supervision. Verify costs on new products. Compare standard cost with actual cost. May involve preparation of necessary cost data for control of operations. Requires practical knowledge of products, manufacturing processes and procedures.						
12 to 18 Months	C-3	Jr. Compile factory costs on parts and assemblies following definite prescribed instructions under close supervision. Other junior clerical work as may be assigned.						
5 Years and Over	Cost Estimator F-2	Sr. Compile estimates of cost on standard and special parts or products, as a basis for pricing purposes. Should have engineering knowledge and be able to interpret engineering layouts and data. Requires extensive knowledge of products, designs, manufacturing processes and procedures.						
1 to 3 Years	D-1	Jr. Compile cost estimates on standard parts and assemblies working from positive information.						

Reprinted with permission from the American Management Association, Office Management Series No. 84

estimator — with one lower-graded rank within each classification. General classifications frequently require distinguishing categories within the group. For example, the "Machinist" classification would include separate descriptions for "Group Leader," "Worker" and "Helper." The same approach would be true of practically all of the trades. Graded wage rates are ordinarily more numerous in office work.

One of the chief weaknesses of this plan is its dependence on past records for determining standard job groups and their wage rates. Such an approach is generally recognized as faulty, and was one of the factors which prompted the search for a more objective basis for determining job values. Furthermore, the classification descriptions are often expressed in such broad terms as to make it difficult to allocate jobs with detailed characteristics not found in the broad description. Working conditions and physical requirements, for example, are usually not considered. Differences of degree in such factors as worker responsibility and mental effort required are frequently lacking among the lower classes of jobs. Such deficiencies are not so important in many office jobs, but they are often very serious in industrial job rating.

The relative inflexibility of this plan is another defect for industrial use. Industrial jobs, subject to frequent changes in content, and to annual bargaining for pay rates, cannot be so easily pigeonholed as the plan assumes.

Speed and low cost are the chief virtues of the classification plan. Its relative simplicity also aids in obtaining employee acceptance. In spite of these advantages, the classification plan often omits some relatively important job characteristics and is particularly weak in classifying the job of an employee whose work cuts across two or more classifications.

Job Ranking

Job Ranking arranges all jobs in the order of their importance. Because job titles and brief job descriptions are written on separate cards for the purpose of sorting them into a series based on their importance, this plan is sometimes called the Card-Sorting System. It is also referred to as the Job-to-Job Comparison Plan.

Various methods are used for ranking the jobs. The original work may be done by a small committee whose members are supposed to know something about all the jobs in the plant. With all job descriptions reduced to uniform-sized cards, the committee may start by selecting the easiest and most difficult jobs, by consensus. Then certain other well-recognized jobs are ranked in between as standard guides. This process is continued until all jobs have been ranked in the order of their importance. Since the committee decisions are long drawn out as a rule, individual members may be asked to do their own ranking, with the committee meeting afterwards to iron out differences in the individual rankings.

Another method, aimed at making the ranking more objective, is to ask individual committee members to rank all jobs a second time without reference to their first ranking. After the final ranking has been agreed to, the committee sometimes divides the total number of jobs into groups for the purpose of setting group rate ranges.

Job Ranking, like the Classification Plan, has the advantage of speed and low cost. But since its decisions are reached by comparing each job with every other, it tends to create more dissatisfaction than the Classification Plan. In a small plant, Job Ranking may be satisfactory if the members of the ranking committee know the jobs and can rank them without too many differences in their subjective appraisals.

But there are serious objections to the use of this plan for any situation other than a small shop. In the first place, it is difficult to find committee members who know all the jobs sufficiently well to arrive at a final ranking without a lot of compromises. In the second place, the final ranking is based on the over-all impressions of the judges, usually without adequate substantiating data. This makes it very difficult to support the ranking when worker dissatisfaction arises, especially since no records are retained or reasons compiled. Finally, it is difficult to fit new jobs, or jobs whose content has changed, into a system which was built on personal opinions to begin with. Certainly nothing like general satisfaction could result in such cases unless the original committee members were available to make the adjustment.

Factor Comparison

Factor Comparison gets its name from the method it uses in making job evaluations. In other words, this plan compares a number of factors as they are related to each job. The factors usually considered are *mental effort, physical effort, skill, responsibility* and *working conditions.* Each of these factors is appraised for all jobs. The recognized method is to make an appraisal of one factor for all jobs before considering any of the other factors. This approach gives more accurate final results in that it precludes attempts to arrive at predetermined values for any one job. Evaluation by this system is frequently aided by the selection of "key jobs" covering a wide rate range. These jobs act as weather vanes for the raters because of their recognized characteristics and their generally accepted "market" rate of pay.

The first requisite in this plan is a set of adequate definitions for the factors used. With these definitions in mind, those making the job evaluations record their group decisions about the value of each factor on a "Comparison Scale," which uses a comprehensive range of values in cents per hour. Figure 26.2 is a typical Factor-Comparison Scale. In this example, the molder's job receives a total rate of $1.09. The total cents-per-hour values for the five factors equal the rate for the job classification concerned. This figure expresses its factor value in cents per hour.

It is readily seen that evaluating five factors for every job is a much more laborious task than that encountered in using the Classification or Job-Ranking systems. There are objectionable features other than the time and cost of this Factor-Comparison Plan. One is that the raters leave no data to show how they arrived at the money values of the various factors. Fitting new jobs into the scale at a later time becomes relatively difficult because of this omission. Furthermore, there can be no assurance that subsequent ratings are "level" with the original job ratings. In other words, the weighting of factors is mostly subjective, and largely based on faith in the judgment of the original raters. Another defect of this system is its lack of any adequate basis for dealing with objections raised by union representatives. And finally, it is relatively difficult to re-rate job factors into new money values when negotiations between labor and management provide for a general wage change.

The Point System

The Point System is generally recognized as superior to the other three, and is in more general use. The chief defect of the other systems is the lack of sufficient differentiation among the factor values used. Factor definitions, when used, are often too general for systematic application to the various jobs. The Point System overcomes this objection in its more analytical approach to factor values, the basis of which is *degree point values* for the factors considered. Degree values recognize a series of valuations for each factor, thus making it possible more accurately to relate the value of each factor used to the specific job for which it is a characteristic.

FIGURE 26.2

Factor Comparison Scale

Cents	Mental Effort	Physical Effort	Skill	Responsibility	Working Conditions
40					
39					
38					
37					
36					
35					
34					
33					
32					
31		Molder			
30					
29					
28			Molder		
27					
26					
25	Molder				
24					
23					
22					
21					
20					
19					
18					
17					
16					
15					Molder
14					
13					
12					
11					
10				Molder	
9					
8					
7					
6					
5					
4					
3					
2					
1					

TABLE 26.1

Weighting of Job Factors*

Factors	Maximum Weights	
1. Education		
a. Actual schooling	130	
b. Experience and training	100	
TOTAL		230
2. Skill, Manual and Mental		280
3. Responsibility		
a. For the safety of others	60	
b. For spoilage of parts and materials	50	
c. For damage to machines and equipment	50	
TOTAL		160
4. Mental Effort		100
5. Physical Effort		100
6. Working Conditions		
a. Surroundings	50	
b. Hazards to self	40	
c. Connected expense	20	
d. Burnout involved†	20	
TOTAL		130
GRAND TOTAL		1000

* From the manual of Hodges & Associates, Dayton, Ohio.

† Burnout refers to premature inability to continue at a trade because of some industrial disease or debilitating condition contracted on the job.

The first step under the Point System is an adequate job analysis. The final evaluation will be, to a considerable extent, just as good as the job analysis on which it is based. With this as a prerequisite, the next step is the determination of the job factors to be used. Usable factors may range from three to about fifteen. Usually they are broken down into subfactors, so that a "five-factor plan" may contain as many as fifteen actual factor evaluations. The specialists are not agreed on the correct number of factors for the best results.[2] One group of factors found useful in an industrial job evaluation, with their maximum point values, is shown in Table 26.1.

---

[2] In "A Statistical Study of a Job Evaluation Point System," *Modern Management*, Vol. 7 (April 1947), pp. 17–23, Eugene J. Benge points out that his research shows that consideration of the "experience" factor alone gave a ranking similar to that obtained from eleven factors, with a positive correlation of .97. By adding two more factors — "safety of others" and "working condition" — the correlation was increased to .99. This research also shows that with the use of seven factors "all jobs save two would have placed in the same grades as those which resulted from the use of eleven factors."

Every job to be evaluated involves a greater or lesser amount of each factor or subfactor shown in Table 26.1. Thus, to assign a total score to any job, we must have some way of finding out *how much* of a given factor is needed to perform the job satisfactorily. Table 26.2 shows a range of values for the variable factor of "Actual Schooling." The low point on the range — ability to carry out verbal orders — is assigned a total value of 5 points and given the code "A." Thus if a job is coded "A," there is the presumption that none of the other abilities on the list are required for performing the job successfully. The range of schooling requirements in Table 26.2 is arranged from the lowest to the highest. It is assumed that any given requirement involves more ability than all of the preceding ones. Similar ranges must be established for the eleven other variables shown in Table 26.1 before the job can be assigned a total score.

In addition to the usual group of job factors, a so-called basic factor is occasionally added. It represents characteristics which are common to all jobs, including the attribute of honesty, regard for the safety rules and willingness to cooperate. To recognize these attributes, and to add psychological worker acceptance, some arbitrary value such as 300 or 400 points is frequently added to the total of the evaluated factors. The relative positions of the job scores are not affected by the addition of these basic points.

TABLE 26.2

Range of Point Values for the Subfactor "Actual Schooling"

Code	Requirements of the Job	Points
A	Ability to carry out verbal orders	5
B	Ability to make a written report	10
C	Ability to work as helper to a trade	15
D	Ability to comprehend requirements for flow of materials, etc., and control movements	20
E	Ability to operate a machine tool on repetitive work	35
F	Ability to make a simple mathematical calculation OR operate materials-handling equipment	50
G	Ability to carry out routine jobs without close supervision — such as setting up automatic machines or operating a crane	65
H	Ability to figure in fractions, decimals and percentages OR make emergency adjustments and repairs	80
I	Ability to apply the fundamentals and principles of mechanics, electricity or chemistry	95
J	Ability to understand and operate from complicated blueprints	105
K	Ability to make analyses, subject to supervisory checking; to use shop mechanics, including algebra and geometry	115
L	Ability to analyze requirements from sketches or blueprints without close supervision	130

The Point System has several advantages over the other plans, in spite of its higher cost and time-consuming details. In the first place, it results in an accumulation of records which can be referred to later if worker objections are raised. Also, it tends to promote uniformity in evaluating new or changed jobs, by using the same criteria developed for the original evaluation. In the third place, since it is more detailed and technical than the other plans, it is likely to be more objective. Finally, its determinations are frequently arrived at by joint committees of labor and management representatives, which lays a healthy foundation for initial acceptance of the plan by labor and for continuing cooperation.

Other Considerations in Job Evaluation

The evaluation manual

The dictionary defines "evaluate" as "to appraise carefully." The job-evaluation manual is therefore a handbook guide to insure the careful appraising of jobs. Used as a guide for a series of such appraisals, it necessarily establishes a fairer relationship of values among the jobs being rated because of the standards which it sets up.

A manual is often used to define the various factors employed in the Point System. When properly prepared, it creates confidence among the workers and their union representatives; it sets forth the fundamentals for job content on the various levels of management, including foremen; and it is the master guide for the job-evaluation committee in its work.

Assuming intelligent committee members acquainted with the jobs involved in the rating, the manual sets forth standards for the completed evaluation. The following subjects should be included:

1. An introduction explaining the purpose of the evaluation and the general method for carrying it out.
2. A recital of authorization for the evaluation, over the names of both union and management representatives.
3. The extent of coverage of the evaluation program, noting the jobs that are included.
4. A list of the job factors to be used, with their definitions, and an explanation of the basic points, if these are included.
5. Weights given to the various job factors and their variables, with explanatory guides for applying them.
6. Evaluation scales for determining factor point values.

It is also important from a psychological standpoint to list any job classifications which are to be omitted from the evaluation, explaining the reasons. The manual should be written in language simple enough to avoid any suspicion of double or hidden meanings. Explanations should precede the actual factor appraisals. A sample page from a manual will clarify this procedure:

Factor	*Maximum Points*
I. EDUCATION	
A. ACTUAL SCHOOLING	130
B. EXPERIENCE AND TRAINING	100

A. *Actual Schooling*

Definition. This factor measures the general intelligence required for the adequate performance of the job.

Discussion. Formal education is not essential in developing intelligence. However, it is customary to measure it in terms of equivalent schooling. Levels of education are established by listing the abilities which indicate stages of intelligence. It is immaterial whether this intelligence, or measure of education, has been established by formal education.

Example. A first-class pattern-maker requires more education than a janitor. Satisfactory pattern-makers are found among high school and apprentice graduates. Less education is expected of a janitor. For job evaluation purposes we conclude that a first-class pattern-maker's job requires an education equivalent to both high school and apprenticeship courses, but something less than a grammar school education is required for a janitor's job.

Setting the wage rates

The base rates and rate ranges for the Classification and Job-Ranking systems are based on the company's wage experience. These wage rates should be corrected by industry and community surveys, to be discussed shortly, but the relationship among the job groups should be established by the evaluation.

Wage rates for the Factor-Comparison system are fixed directly by adding the money values established for the job factors or characteristics considered. As noted, there are usually five factors.

The Point System fixes job values in terms of points. Determination of the actual wage rates is a mathematical process based on the value of the point. The wage rates of the high and low job classifications are customarily determined by labor–management negotiations. These rates are a reflection of market pressures, tempered by the going rates in the community and the industry affected. The difference between the high and low point values, divided into the difference between the high and low wage rates, establishes the value of the point. This momentary point value, multiplied by the number of points for each job classification, fixes the base monetary values for the classifications. After this group of base rates is determined, it is the duty of the evaluation committee to check each classification rate against community and industry rates. The final result may throw some job classifications out of line on the basis of point values, but the differences will be few, and relatively small percentagewise. Furthermore, the finished evaluation will be more realistic, and hence more acceptable to the workers, should explanation or defense become necessary.

The rate range

Under the single-rate system of wage payment, job evaluation sets the base rates for each of the classifications. When the rate-range, rather than the single-rate plan is used, then these base rates customarily become the midpoints of the ranges for the several classifications. The rate range provides for a series of wage rates below and above the midpoint. The spread of this range averages from ten to twenty-five cents, usually with steps amounting to five or ten cents below and above the midpoint. It is customary for a worker to start at the bottom of the rate range unless he has been transferred from some other job in which he was at a point in the range higher than the bottom rate of his new classification. This is likely to happen even when the worker is being promoted, because the rate ranges for adjacent classifications frequently overlap. Table 26.3 shows a typical rate range, and the overlapping of rate ranges is represented graphically in Figure 26.3.

Advances within the rate range are made on the basis either of seniority or merit. We pointed out in Chapter 25 that labor tends to prefer seniority, management to prefer merit, as the criterion for progression through the range. However, management often goes along with labor in agreeing on simple length of service as the criterion, reasoning that this automatic time-interval plan eliminates subjective opinions about a worker's progress and thereby reduces grievances. Grievances are sometimes more costly to production than the occasional expense of raising the pay of workers whose output has not actually increased when the designated time for a higher rate arrives.

Labor-market survey

Wage rates must have both internal and external balance. Internal balance refers to the fair relationship among all job classifications within the company; external balance means that the wage scale for the various classifications must compare favorably with the rates paid like classifications in the industry or community involved.

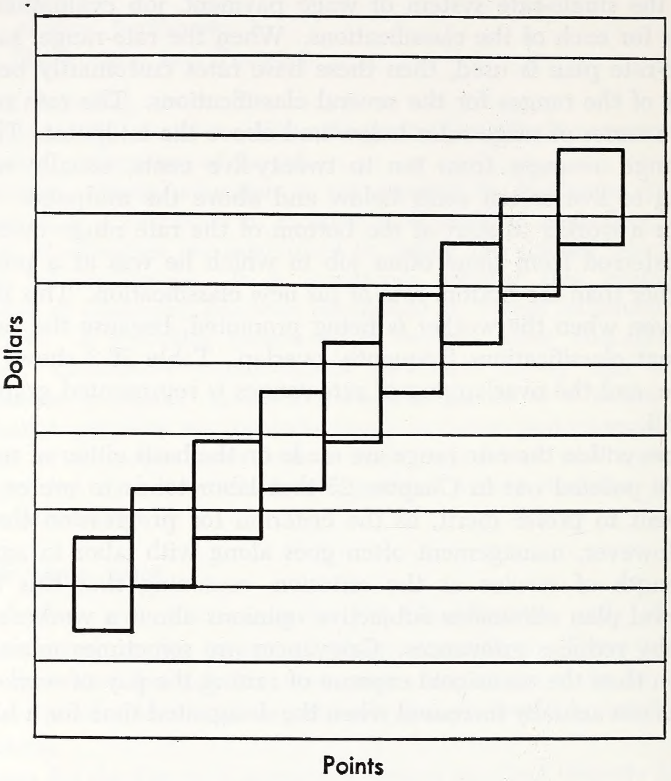
TABLE 26.3

Sample of Rate Ranges in Money Paid

Point Values	Base Rate	$5.00 Range	15% Range
350–399	$35.00	$32.50–37.50	$32.35–37.65
400–449	40.00	37.50–42.50	37.00–43.00
450–499	45.00	42.50–47.50	41.60–48.40
500–549	50.00	47.50–52.50	46.25–53.75
550–599	55.00	52.50–57.50	50.85–59.15
600–649	60.00	57.50–62.50	55.50–64.50

FIGURE 26.3

Rate Ranges Expressed Graphically



The actual wage and salary rates are determined by quantitative value differentials as they are related to the top and bottom pay rates. As has been suggested, these top and bottom rates are often fixed by negotiation between management and the union. In many cases, however, the top and bottom wage and salary rates are influenced by a survey of the labor market. In recent years, the bottom rate has been fixed by state or federal legislation. However, these legal minimum rates are not always acceptable in labor–management negotiations, where the bottom rate is frequently set above the legal minimum by bargaining pressures or conditions of the labor market.

Evaluated rates for classifications lying between the top and bottom negotiated rates must be given serious attention in order to bring them reasonably into line with prevailing community and industry rates. It is against the results obtained from a labor-market survey of similar jobs within the community or industry that corrections are suggested for the corresponding evaluated jobs. The employer does not want any wage rate to be unnecessarily high, for obvious reasons. On the other hand, if any rated job is appreciably below the community or industry rate for that classification, the employer may be priced out of the labor market with respect to that classification. Organized labor demands that a rated job meet the community or industry standard, whichever one is higher — also for obvious reasons.

The results of the wage-market survey present a definite challenge to the rates determined by job analysis and evaluation. In the final round of negotiations, rated jobs must meet competition of the market. Approaching the problem from another angle, the labor-market survey may be used as a corrective guide in fixing the top and bottom wage rates, thus furnishing the focal points for application of the classification differentials determined by the job evaluation. Any wage program put into effect without the benefit of a dependable wage-market survey is definitely headed for trouble.

The wage survey offers an opportunity to compare principles and practices in this important field. The inadequacy of those evaluations which have failed to use the survey technique have often contributed to the bitterness with which organized labor frequently condemns rated jobs and the plan which determined them. Therefore, the use of the labor-market survey for checking the wages of rated jobs cannot be urged too strongly. It not only adds reality to the final results of the job evaluation, but it hastens the day when job evaluation will become more generally accepted by employees.

Who should make the evaluation?

There is some difference of opinion as to whether the job evaluation should be made by company employees or management consulting firms specializing in this type of work. There are advantages and disadvantages both ways. The three simpler plans might well be worked out by company employees who know the jobs from the inside. Furthermore, the company representatives may be available for making desired changes in the rates when the content of specific jobs is changed or new jobs are added. Since the Classification, Job-Ranking and Factor-Comparison methods are all highly subjective, it is almost necessary that the original rating group be available for changes.

With the Point System of job rating, the outside consultant appears preferable. It is true in this case, also, that inside or company employees will have a better initial idea of job content than the outside specialists. But the latter will have a more objective point of view and a much better understanding of the procedures used in this more specialized system. In addition, through training and practice the specialist will probably make a better job analysis. The choice may be based on the question of whether it will be easier for employees to learn the system or for outsiders to analyze job content. There are several disadvantages in using company employees to make ratings under the Point System:

1. They will be more subjective in their appraisals.
2. They will be less skilled in making job analyses because their long contact with the operations causes them to lose sight of the forest for the trees.

3. Employee appraisals may tend to lower worker morale.
4. Key men are often taken away from important jobs.
5. Actual costs are likely to be higher in the long run.
6. The advantage of job-rating experience is lacking, including ability to determine the proper number of job classifications.
7. The objective umpire is lacking.

The best method is probably found in a combination of the inside and outside approaches to the Point-System evaluation. Management consulting specialists would make the job analyses in cooperation with those who are constantly supervising the various jobs. The evaluation committee should include representatives of both management and the employees. It is in this part of the work that the outside specialist should be of great value. It is his job to harmonize conflicting points of view by objective application of the techniques involved. One common fallacy of the inside appraiser is his inclination to think in terms of the man on the job rather than of the job itself. This point of view always produces a prejudice in favor of the specific jobs held by committeemen, with consequent dissatisfaction among workers in other types of jobs.

Just as the inside participants will be invaluable aids to the outside specialist in making the job analyses, so the specialist will be able to lay the groundwork for training company and labor representatives in applying the principles and procedures of this technical form of job rating. With the knowledge gained in the actual evaluation process, company employees should be able to take over to a considerable extent in the later rating of new jobs, or re-rating of jobs whose content has been changed. In any case, final decision about whether consulting service should be engaged depends on both company and worker attitudes. The size of the company and the nature of its work are other important considerations. Concerns employing a relatively large proportion of skilled or professional help will find it advantageous from the employees' point of view to engage specialists to do the evaluation. Unskilled or semiskilled workers are more inclined to be suspicious of technical approaches which they do not understand, whereas professional employees usually favor the professional approach to technical problems.

Conclusions

As is true of most management techniques, job evaluation is no panacea. All the plans have weak points and even real disadvantages because personal judgment enters into all of them in varying degrees. To the extent that this is true, the evaluation procedure cannot be considered strictly scientific. Possibly it should be referred to as "systematic" rather than "scientific" until such time as its techniques permit more objective determination. However, it is a long step forward from the former lack of any formalized plan for fixing wage rates. Prior to the establishment of job-evaluation procedures, rates were determined by purely subjective considerations. The "squeaking wheels" obtained most of the wage increases. Individual and group pressures also played an important part in the rate changes for job classifications, or indeed for individual workers within a classification.

Such haphazard methods result in lack of balance among job rates. It can be clearly demonstrated from experience that employees are more disturbed by the unfair relation between their rates of pay and those of fellow workers on the same or similar jobs than they are by the wage level itself. Under the rule-of-thumb plan of wage-fixing, the settlement of one wage grievance usually begets several more, with consequent wage turmoil. Irrespective of its present weaknesses, job evaluation was born of the necessity for improving such conditions.

Job evaluation does not, of course, guarantee sound labor relations. It is only part of a good personnel program. It can, and often does, bring labor and management together in mutual agreement on fair differentials in wage rates for various job classifications. Specifically, it reduces the number of wage grievances, especially when the established rates compare favorably with community and industry rates for the same or closely allied jobs.

After the job evaluation is finished, many managements make the mistake of concluding that the "ordeal" is over. They seem to be saying: "Thank God that's done!" Nothing could be further from the truth. To the extent that job content, community and industry rates and other factors change, consideration must be given to new differentials among job classifications. "Dynamic" is a proper description for the relationship among job rates, and hence for any job evaluation. New jobs must always be assigned a place in the job-rating scale.

In principle, job-evaluation techniques may be applied to all occupations. In practice, they are used for hourly rated jobs in production and all types of office work, and to a limited extent in the salary field, with the top limit approximating $10,000. Beyond that figure, competition usually determines individual salaries.

QUESTIONS

1. What led to management's quest for some form of job evaluation?
2. Which do you feel is the more reprehensible wage inequity — improper job classifications or different wage rates for the same type of work?
3. Are any of the typical job-evaluation plans scientific in your opinion? Explain the reasons for your answer.
4. Is job evaluation or service rating more important for maintaining worker morale, in your opinion?
5. What is the relation between job analysis and job evaluation?
6. Would you use the Classification Plan of job evaluation for an insurance company with ten thousand employees, operating in all of the states? Justify your conclusion. Which plan would you use if not the Classification Plan?

7. Under what circumstances would you employ outside consultants to make a job evaluation under the Job-Ranking Plan for an industrial concern assembling washing machines on a production basis?
8. Would you include union representatives on the Job-Ranking committee?
9. Which of the job-evaluation plans discussed in the text offers the best basis for defending its findings against complaints of the union local's grievance committee?
10. Why is it probably justifiable for the federal government's civil service to use the Classification Plan for evaluating its jobs?
11. What advantage does the Factor-Comparison Plan offer in arriving at its answers in dollars-and-cents wage rates? Do you feel that this phase of the plan promotes employee acceptance more than the other three plans?
12. Do you believe that the five factors used in the Factor-Comparison Scale are sufficiently selective and inclusive to lead to reasonably good results? If not, what others would you suggest?
13. Are the raters' data sufficient under the Factor-Comparison Plan to defend their results against union complaints?
14. The Point System is usually the most expensive of the four plans for evaluating jobs. Do you think that the results justify the extra cost? Can you give three good reasons, if your answer is "yes"?
15. What disadvantages would you find in the Point System? If you think it is too complicated for the average worker to understand, how would you simplify it?
16. Do you think that the evaluation manual explains the Point System sufficiently to make the plan understood by the average worker?
17. Are you in favor of raising wages within the classification range on the basis of time on the job, rather than on some form of merit? Give the reasons for your opinion.
18. How can changes suggested by a labor-market survey be incorporated in the results of a job evaluation without throwing all the job relationships out of line?
19. Do you think that it is necessary or advisable to employ outside counsel on a Point-System survey? If so, how would you coordinate their work with the insiders who have a more intimate knowledge of company jobs?
20. What are the disadvantages of having a Point-System survey made by an employee group after they have had sufficient training in its application? Do you feel that the workers as a whole would be more suspicious of outside specialists, or an inside employee committee, in making a job evaluation?

CASE PROBLEM

THE JENNER MANUFACTURING COMPANY

The Jenner Manufacturing Company employs 275 workers of various skills in the making of a complete line of metal fittings for plumbing supply houses and many different industrial concerns.

Jenner is generally progressive, and has had two job evaluations made in the past five years by employee committees, using the Factor-Comparison system.

The first committee was composed of three production foremen. The union was officially opposed to the evaluation, and would have no part in it, but was not strong enough to influence management's decision to go ahead with its plans. The final results were not pleasing to top management, and much less so to the union. Some wage rates were raised, but more were lowered. As is the custom, the workers were assured that no reduced rates would affect anyone presently employed, but would be applied only to newcomers and to any present employee promoted to a higher classification. However, no wage survey was made among members of the industry. The union complained that the community survey was unfair because the city was well known for its low wage scale.

Two years ago another attempt was made to evaluate the job classifications, of which fifteen had been added to the forty resulting from the first evaluation. The added classifications were all made at the union's request. Management now feels that many of these added classifications resulted from merely splitting jobs into different grades so that the average wage would be increased for the group affected.

The second evaluation committee was made up of three foremen and three members of the union. Its disagreements were numerous because of the three-and-three membership, and many decisions were reached on a trading basis.

The third job evaluation, this time under the Point System, includes an outside consultant. The factor-appraising committee again numbers six, with management and the union equally represented. The consultant is acting as chairman of the committee, without the right to vote. Each side expects that his objective point of view will work to its advantage.

One thing that led to the present survey was a dispute about the right of management to shift internal grinders to external grinding jobs when that class of work piled up a serious backlog. The two grinder groups were classified separately, at the union's request, and the internal grinders enjoyed three cents an hour differential above the external grinders. Even though management agreed to pay the internal grinders their three-cent differential while working on the lower-paid classification, the union opposed the idea unless both internal and external grinders were paid the higher classification rate while both groups were doing external grinding.

The company wants some kind of plan whereby it can shift workers in the finely split classifications from one job to another without paying a temporarily higher wage to the lower-rated classification, when its production is forming a bottleneck.

PROBLEM. If you were the outside consultant, how would you go about trying to effect the company's purpose, and how would you sell your idea to the union?

CHAPTER 27

Service Ratings

Job evaluation establishes the comparative values for a group of job classifications. Service, merit or progress rating establishes the comparative values of the workers on the job. Other titles given to employee ratings are sometimes used because of their supposed psychological value with the workers, such as efficiency rating, performance rating, development record, and evaluation record. However, "service rating" seems to enjoy a general preference.

Job evaluation is expressed ultimately in money terms, service rating in terms of relative service values or numerical scores. Both procedures attempt to arrive at values in relation to some accepted standard measurements of the characteristics or traits included, whether they are dealing with a job or a worker. Objectivity is the goal of all these measurements, and standards naturally help to achieve this goal. In both cases, however, since the standards are being applied by human beings, full objectivity is impossible. Various other devices are employed in both job evaluation and service rating to reduce the effect of the human or subjective element. Although the goal is difficult, satisfaction may be derived from the knowledge that we are working in the right direction.

Because many employee privileges are often dependent on the value of the worker's services to his employer, service ratings, like job evaluations, have been in use for a long time in every organization employing people, but the early methods of rating were purely rules of thumb. The big boss or the foreman often rated the performance of his workers on the basis of inspired judgment, influenced by conscious or unconscious personal bias. The idea of a scientific approach to service ratings was born of the necessity of getting away from personal decisions regarding transfers, promotions, pay increases and disciplinary action. The larger the organization, the more harmful are arbitrary decisions in evaluating worker performance. The bad effect on morale, and hence on productivity and quality, is clearly evident when service ratings are made without any attempt at objective measurement of personal characteristics.

In spite of the fact that formalized service-rating plans have been in use within recent years, many companies make only limited use of them because some unions insist on basing such employee privileges as transfers, promotions and layoffs, on seniority, and have so provided in their contract agreements with management. Determination of many worker privileges on the basis of seniority has been substituted for service rating simply because the objective character of many of the rating forms did not develop fast enough, or with sufficient objectivity, to warrant general acceptance by the workers. In addition, many plans fell into disrepute because of the failure of those who did the rating to follow instructions for using them properly. Specifically, the degree of acceptance of the different plans has varied almost directly with the objectivity displayed by the raters. The lesson is quite clear. Although formal service-rating plans are usually considered superior to personal judgment, such a conclusion is based on the assumption that the plans are as objective as possible, and that they are operated in such a manner that their objectivity is preserved in action by the raters. To insure these qualifications to a reasonable degree, management must provide methods of control for policing the system, so that it is carried out according to instructions.

The purposes of rating

A recent survey (1954) conducted by the National Industrial Conference Board found that 46 per cent of the companies employing more than a thousand workers used some form of service rating for hourly rated workers; 35 per cent of the companies with fewer than one thousand employees had such plans. For salaried workers, the coverage was even greater: here 61 per cent of the larger companies and 45 per cent of the smaller ones had formal service-rating systems.[1] This widespread use shows that service rating has much practical value for management.

In Chapter 25 we spoke of service rating exclusively as a criterion for promoting workers through a rate range, but employee-evaluation schemes have many more uses than this. What are some of these uses? [2]

1. *Morale.* An employee's desire to know where he stands with his employer is a human trait. A well planned and executed service-rating program satisfies that human desire, even where the ratee disagrees with the results. Because he knows what the boss or the company thinks of his services, he has a working basis for acceptance or disagreement. If the rating is fair and the employee is receptive, there is a common ground on which to discuss shortcomings with his superior. When service ratings can be handled in this

---

[1] *Personnel Practices in Factory and Office* (5th ed.; New York: National Industrial Conference Board, Studies in Personnel Policy No. 145, 1954), pp. 15, 16.

[2] The National Industrial Conference Board compiled a list of ten practical applications of service ratings from its survey of ninety-four companies. The list may be found in Reign Bittner, "Developing an Employee Merit-Rating Procedure," *Personnel,* Vol. 25 (January 1949), p. 277.

way, they can be definite morale builders. When the ratings are unfair, or the worker is belligerent, the loss of individual morale may have fairly widespread repercussions.

2. *Aid to Superiors.* With proper instructions about how to rate, the receptive supervisor becomes conscious of the comparative values of his subordinates. This new attitude helps him to improve the quality and quantity of work in his department. By substituting analysis for irritation, he aids and improves his own job of day-to-day supervision. With the necessity for periodic appraisals, the foreman or supervisor starts to recognize the good and weak points of his workers. Although the rules occasionally provide that the supervisor is not obliged to discuss a worker's shortcomings except at rating time, he soon acquires the habit of talking over such weaknesses as they occur. Praise and criticism also become a daily working habit rather than a semiannual recorded evaluation. When this changed relationship occurs, it improves supervisor–worker relations, to their mutual advantage and the company's profit.

3. *Probationary Employees.* In personnel management, a probationary is a new worker who must serve satisfactorily for thirty to sixty days before his name is added to the "seniority list," with its many employment advantages. Unless the foreman files some objection with the personnel department, the probationary worker's name is customarily added automatically to the permanent list of employees as of the date he started to work for the concern. For this reason it is important that the foreman notify the personnel department about his wishes regarding the new employee before the expiration of his probationary period, which is customarily fixed in the labor–management agreement.

When the supervisor records items of the probationer's performance for the purpose of helping with his periodic service ratings, he is not only armed with data to aid in deciding whether to retain new workers past their probationary period, but he is also made conscious of the importance of probation. More often than not, supervisors allow the probationary period to pass unnoticed, sometimes to their regret. They find out, after it is too late, that they have a permanent employee who is unsatisfactory. This fault has become so common that the personnel department frequently maintains a tickler file on probationers for the purpose of warning foremen that the probationary period will soon expire.

4. *Pay Adjustments.* Service ratings may well be used for pay adjustments, both upward and downward. This is especially true when the wage changes are within the rate range of the job classification, and made on the basis of merit rather than on some automatic progression plan, as discussed in Chapter 25.

5. *Transfer, Promotion, Layoff and Dismissal.* All of these actions should be, in part, a reflection of the workers' service ratings, which are an important component of their personnel files.

6. *Recruiting.* The service rating is an aid in measuring the efficiency of

the recruiting program and procedures, as well as the basis for improving both.

7. *Disciplinary Record.* The nature of disciplinary action may be tempered or intensified, within the limits prescribed by company rules, by the worker's service-rating record.

8. *Job Placement.* The relationship between the workers' prehiring records and their service ratings suggests that certain backgrounds indicate desirable traits for some types of jobs, while they are warning signals for other jobs. In this sense, the over-all analysis of service ratings by the personnel department produces valuable guides for screening applicants, irrespective of their test results.

Factors, grades and degrees

The development of a rating system involves (1) selection of factors or traits to be measured, (2) determination of the weighted values or points to be assigned to each trait, and (3) the specifications for determining the degrees into which the various traits are to be divided.[3]

1. *Selection.* The selection of the factors and traits to be rated depends, in the first place, on what is to be evaluated. It may be that the ratee's worth to his employer will be the basis for determining the traits. This would be true if the rating is to be used primarily for deciding on changes in his wage or salary. Or it may be desirable to measure those characteristics which will influence his future advancement. In the former case, such factors as production quality and quantity, supervision required and cooperation would be of interest. They all affect the worker's present ability to contribute to the concern's welfare. On the other hand, measurement of personal characteristics or traits, such as dependability, initiative and loyalty, may be used for predicting the worker's potential usefulness over a future period.

These two groups of factors and traits measure different things, and should not be combined indiscriminately. If used on separate rating sheets for the same class of workers, they may be useful in deciding whether or not individuals in the group are performing as well as they are able. Separate ratings that produce confusing answers may indicate that the selection of factors and traits for the rating charts leaves something to be desired.

An excessive number of employee traits not only indicates lack of discrimination in their selection, but causes most of the outstanding complaints against service-rating systems in general. "One survey of 18 charts used by 18 companies showed a total of 35 traits used on one or more of the charts." [4] A summary of 125 companies showed 131 traits. The usual number of traits on relatively successful charts varies from five to fifteen, depending on the nature of the company's business and the type of work of those being rated.

---

[3] "Traits" and "factors" are used synonymously by many writers. The distinction used in this text is that while "factors" indicate such measurable items as quality and quantity of work, "traits" refer to personal characteristics of the ratee.

[4] Joseph Tiffin, *Merit Rating, Its Validity and Techniques* (Personnel Series No. 100, American Management Association, 1946) p. 21.

2. *Trait and Factor Grades.* Each trait or factor should be carefully defined, and they must be mutually exclusive for satisfactory evaluations. Some are not only weighted or graded, but further measured by degree values within the grades. The relative weighting of the grades is difficult, and presumably only approaches scientific accuracy. This is obvious when it is realized that the same trait or factor should be classified into appropriate grades when applied to different work groups. The factor that may be important with one group may be relatively unimportant in another. In other words, the weighting of the grades should relate to the situations where they are to be used. Whenever possible, examples of weighting distinctions should be given to illustrate and justify the rating instructions.

3. *Degree Values.* Various grade weights are frequently broken down into degrees of value. The range of these values is expressed in various ways, as indicated by some of the rating-system illustrations in this chapter. For example, some systems show the degree values by a series of numbers arranged vertically; others indicate values within grades on a horizontal graduated scale.

To summarize, each trait or factor must be carefully defined. The grades into which they are divided must also be explained. Traits and their grades, including the range of values for each grade, should be tailor made for the situations where they are to be used. General applications, or dictionary definitions, will not be generally useful in practice.

4. *Factors and Final Values.* The simplest range of values for individual factors or traits, and/or final rating scores, is "satisfactory" and "unsatisfactory," and there is some considered opinion favoring this elementary distinction. However, it is more usual in this rating category to use finer variations, such as *unsatisfactory, below average, average, above average,* and *excellent* or *superior.*

A survey of a large federal agency by the author showed that the majority of employees favored a three-point range of *unsatisfactory, satisfactory,* and *superior.* It was further suggested that an unsatisfactory worker should be transferred by the personnel department on the assumption that his trouble might be the result of some personality conflict. It was agreed by the employees that only two such transfers should be permitted; personality conflicts with three different chiefs were thought to be sufficient cause for permanent separation from the service. The employees also suggested that the "superior" rating should not be given to more than one employee in fifty, and should be recognized by a pay increase or job promotion. It was argued that this restriction of the "superior" classification would eliminate any tendency for supervisors to rate all of their subordinates too high.

The disadvantage of rating from "unsatisfactory" to "excellent" is that it allows too much leeway for basing decisions on the rater's personal opinions. What is a "very good" evaluation of a trait by one rater may be as low as "poor" with another rating a different group in the same department and using the same instructions. Furthermore, there are usually some raters who determine at least some of the trait-rating scores on their general opinion of the ratee.

Good rating characteristics [5]

1. There must be cooperation between the supervisors who do the rating and the agency responsible for planning and operating the system, usually the personnel department. Too often, the supervisor feels that he knows his people without any scientific aids, which he considers time-consuming nuisances. On the other hand, compulsory cooperation in this field will never reach the desired goal.

A certain supervisor, opposed to the rating system in use, which he did not understand, took considerable time in studying its method of allotting plus and minus points for the various factors so that he could compel the system to yield the final scores which tallied with his personal opinions. He actually rated himself in a sense by ignoring the plan and purpose of a system whose mechanics he attempted to master backwards.

2. The plan of service rating must be made as simple as possible, so that both workers and supervisors can understand it. They do not have to understand the experimental techniques or the correlational analysis that underlie the final method of scoring debits and credits. Knowledge of these details is no more necessary to a favorable opinion of the system than is an understanding of the internal combustion engine to the pleasure of driving a car. Satisfaction in both cases derives from confidence in performance.

3. Those concerned must believe in the fairness of the system. This attitude can be produced at the start, if the rating system deserves it, by simple explanations of its operation. The receptive attitude can best be maintained by uniform application of the rating standards.

4. The general plan of rating should be the same throughout the company; and within a given department, both the general plan and the precise details should be uniform.

5. Maximum objectivity must be the goal. This is approached by controlling the simplicity of the criteria used in the rating scheme. It is fostered by the group training of supervisors in the use of the system, and by later spot checking to see that they comply.

6. The regularity with which a plan is used is an important factor in making the employees feel that it is worth while. The more confidence the employees have in the plan, the harder they will try to correct their own shortcomings as revealed by the plan's ratings.

7. The employee should know his final rating and the reasons which contributed to it, thus giving him an opportunity to appeal if he feels that there has been a mistake or injustice. The right of appeal need not be

---

[5] Taken largely from Henry G. Hodges, *City Management* (New York: Appleton-Century-Crofts, Inc., 1939), pp. 80–83.

burdensome or embarrassing to the rater since the burden of proof is on the employee.

8. Unusual services helpful to the employer should have a place on the service-rating record. Since it is agreed that incentives may well take some form other than financial, every device should be used to develop them.

9. Service ratings should give credit for successful training sought by the employee while on the job. If in-service training is to become a major incentive to better work, it must receive recognition. Satisfactorily completed courses in line with the worker's duties, taken at recognized educational institutions, will ordinarily have a salutary effect on the quality of his work, and should be noted on his service record. If the rating system is to "measure the man as a whole in relation to his worth to an employer," then additions to his knowledge in the field of his duties should receive consideration.

Rating Systems

Although there are many rating systems currently used with more or less success, all of them are based on some application of one or more of the following general plans: (1) a form of "scale" used to indicate trait or factor values, (2) a comparison of employees to determine their relative values, and (3) some type of check-list. There is no best rating system unless that designation might be applied to the plan which best fits the particular situation for which it is intended. On that basis, there might be a number of "best plans." Since the value of any rating system must be judged, in part at least, by its service in a given situation, a discussion of some of the best known plans, with their advantages and disadvantages, will furnish basic information on their comparative values for rating employees.

Graphic scale

The graphic scale, whatever special form it takes, is probably the most widely used rating system. In its simplest form it is merely a graduated line with marks or spaces for indicating the relative value of any trait or factor, from its highest to its lowest value. At one end of the line is the name and brief description of the factor being considered. Each line represents some factor or trait. To help the rater, the divisions on the scale furnish explanations of their values. There are several variations of this general plan, but their purpose is always the same — to assist the rater in making a correct and objective decision.

In some scales, point values are marked along the scale. The sum of the values as selected by the rater determines the ratee's total score. Comparison of total scores establishes the relative value of the ratee.

There has been considerable success with this rating system when the rating factors and their values are properly weighted, and the raters do an acceptable job. The graphic scale is relatively easy to use because the principle behind it is generally understood. It becomes even more effective when it includes space for comments on each factor by the rater. The scores are reliable to the extent that the various raters have the same understanding of the instructions. When the raters do not agree in their interpretation of the value explanations, then the plan is open to "halo" and "constant-error" effects. Also, it is often contended that the use of defined standards is something of a liability in scale evaluations. Another common criticism of the scale method of rating is that its traits often overlap rather than being mutually exclusive.

In conclusion, there are many varieties of graphic scales, and although all have some defect, their popularity continues where there is faith in service ratings.

Paired comparison

The paired-comparison method compares one employee with another. The plan is not new, but recently it seems to be gaining in popularity. The rater is asked to state which of two ratees is superior, either with respect to a given trait, or on an over-all basis. The over-all rating is more popular. When the usual group of five workers are to be compared, there will be ten pairs for the rater to evaluate. The result of these comparisons is the basis for individual ratings. The theory supporting this system holds that the average person can make a more reasonable decision when he is comparing two people than when he is rating one individual by comparison with some written standard.

The paired-comparison system apparently does reduce the error of judgment found in comparing a person to a standard, but not to the extent that many of its proponents claim. Their further contention that the distribution of a large number of these paired ratings produces a normal curve has not been borne out by experiments.

Paired comparison is relatively easy for raters to understand, and their training period is short and consequently inexpensive. This plan is particularly effective when there are many ratees on the same or similar jobs. It is unsatisfactory when only a few are rated.

Man-to-man

This system is similar to the paired-comparison plan, except that the rater ranks a group of employees in the order of their value. It is customary to supply the rater with cards, each of which carries the name of a ratee. The cards are then sorted from the highest to the lowest. This form of ranking does not show the differences in value of the ratees involved, which is a material defect for some purposes.

Man-to-man rating in its simplest form is speedy and inexpensive. But for best results, some refinements are needed. The plan is improved somewhat by dividing the ranked employees into various groups, such as highest, average, and poor, or a larger number of finer distinctions. Also, a few simple factors can be used on a man-to-man basis, further improving the results. Some plans using this system describe the characteristics of representative workers of various grades.

It seems obvious that the man-to-man system is as good as the experience of the rater with those concerned. A second rater might improve the validity of this plan if his knowledge of the group was adequate for the purpose. Too often, however, a second rater follows the lead of the supervisor's rating which makes his opinions purely perfunctory. Since the simple ranking of a group has very little scientific basis, its results are difficult to defend. Furthermore, additions to the work force pose problems of placement within the established rankings.

Forced choice

This is a form of check-list which developed from the desire to make ratings more objective. Under some systems, the friendly supervisor can practically "rate" an employee into a better job. The outstanding change brought about by "forced-choice" rating is the inability of the rater to predetermine the final score of the ratee. The details for accomplishing this desirable result are described by a specialist in this field.[6]

> A number of groups of four statements descriptive of supervisors were set up, like the following:
>
> 1. Avoids responsibility
> 2. Inspires pride in the organization
> 3. Lacks sense of humor
> 4. Offers suggestions
>
> The rater was then asked to choose from each group of four statements the one that was most descriptive of the person to be rated and the one that was least descriptive.
>
> Now two of the statements are favorable to the person and two of them unfavorable. The two favorable statements look equally attractive to the rater and the two unfavorable look equally unattractive. At least they would if they had been paired on the basis of research. The important point is that only one of the favorable statements counts for the person and only one of the unfavorable ones counts against him. But the rater does not know which these are because the scoring key is not revealed to him. So he is forced to decide solely on the basis of how *he* describes the man. If he is biased, he cannot mark the one that will reflect his bias because he does not know which one that is. He does not have to wrestle with trait names or the problem of how many points to give because he is merely asked to choose which of four rather dissimilar statements best or least describes the person.
>
> The trick, of course, is to set up these groups of four statements, and much research must go over the dam before this is achieved. I shall not attempt to

---

[6] Reign Bittner, *loc. cit.*, p. 290. Quoted with the permission of the American Management Association, publishers of *Personnel.*

go into this in detail but shall merely sketch the steps involved. They are the following:

1. Gather actual words and phrases used in describing supervisors.
2. Cull them for observability and universality.
3. Scale them for their degree of attractiveness or unattractiveness.
4. Determine how well each discriminates between good and poor supervisors.
5. Determine the score that each gets in adding up the total score.
6. Verify the scoring system set up by check experiments.

The Army developed this system during World War II. Formulation of its statements are difficult and should be drafted by specialists. Its comparative accuracy, with good statements, is high because of the clarity of the statements and their relative freedom from misinterpretation. Its chief defects are the difficulty of preparing it and the fact that its scoring is secret, which develops employee antagonisms.

Weighted check-list

This plan is based on a list of statements of traits or factors to be checked by the rater for each employee. Since the "list" should be made up to apply to a particular job group, a number of lists must be made to cover a large work force. Each statement has a numerical or scale value, indicating the ratee's performance. A total rating may be determined by adding the individual values.

The development of good check-lists is difficult, as is also the establishment of fair weighted values for the statements. Both should be made by psychologists familiar with the type of work concerned. The accuracy of the list as a measure of the worker's worth depends on its pertinency to a homogeneous group. When one list is used for a wide range of jobs, the results have questionable value. It is also obvious that the weighted value for a given statement will be different for various job groups. One of the advantages of the weighted check-list derives from the leads it furnishes the foreman in discussing the worker's strong and weak points with him.

Rating Procedures

Rating procedures should differ among various companies, depending on the purpose or purposes to be accomplished, the range of different jobs to be covered, the size of the various job groups involved, the ability of the raters, the time and expense funds available for the rating procedures, and the general level of acquiescence accorded the system by the interested groups of workers, management, and the union, if the concern is organized.

Who should be rated?

It is customary in introducing a rating scheme to evaluate only the hourly rated workers. Unless the proposed systems have been thoroughly explained to all hourly rated employees and received a reasonable degree of at least tacit acquiescence by all the workers and management, it might be advisable to start by installing the plan in a single department. Without attracting too much opposition the first year, the adopted system has a better chance to prove itself in operation. The experience can be used to good advantage in satisfying reasonable opposition by ironing out obvious mistakes.

If it is decided to rate all hourly rated employees from the beginning, the system should not be put into operation until after a thorough educational program has been completed, with ample opportunity for all interested parties to be heard. One or two years' experience in rating this larger group will afford a still better opportunity for minimizing defects in the plan adopted, besides gaining a reasonable degree of acceptance before attempting to introduce the more difficult task of rating the clerical, salaried and executive groups. Difficult as it may be to rate the salaried and executive groups, they should ultimately be included as experience and acceptance justifies. Among other advantages, inclusion of most management levels increases worker confidence in the general idea. It is understandable that rating executive, and even some clerical characteristics, is more difficult than evaluating hourly workers' traits. However, if the system is satisfactory, it furnishes an excellent background for eliminating incompetent leaders. The hourly paid workers, on the other hand, frequently have a powerful union or organization to support their resistance to dismissal on the basis of service ratings.

Who should rate?

It is generally agreed that the employee's immediate supervisor should rate him in the first instance. The supervisor presumably knows most about the ratee. This intimate knowledge of the ratee's performance or traits does not, however, prevent the foreman rater from registering a biased evaluation. It is more or less common practice to have one or two additional raters add evaluations to that of the immediate supervisor. Theoretically, this multiple rating is supposed to offset any subjective values of the first rater. The theory would have considerable validity if the supplementary ratings were made independently, but this has not been the case in practice. Many rating forms provide for recording the so-called multiple ratings on the original rating sheet in parallel columns so that the two or three ratings for each factor or trait appear together when the record is complete.

Since the supervisor or foreman usually rates first, it is quite natural that the checking or supplementary raters should be guided by what the first rater does. If the supplementary raters have had close association with the ratee, which is usually not the case, they may sometimes disagree with the first rater's evaluation, but this is not customary. In most cases, the first rater is a subordinate of one of the supplementary raters. If many of the latter's opinions conflict with the former's, the superior is, in a sense, losing confidence in his subordinate's judgment.

What actually happens in many cases is a discussion between the original rater and his chief. As a result, all the factor ratings are the same. One or more has certainly been determined by compromise. The less the supplementary rater knows about the ratee, the more inclined he is to accept the original rater's opinions. Under such circumstances, the "checking" process is largely illusory. When a third rater enters the picture, the results are often still less valid. The fact is that in most cases the first rater is the only one capable of appraising the ratee from personal observation. The other two must depend largely on factual records, in which case any analyst could score the ratee.

The additional raters are also inclined to support the opinions of their subordinate, the first rater, because to do otherwise would tend to undermine the supervisor's ratings. This situation becomes particularly important when the ratee has an opportunity to go over his record with his foreman, creating a face-to-face relationship which depresses rather than increases morale and productivity.

On the basis of these features of rating, it is an open question whether better rating results are obtained by a single rater who carries the responsibility. Some authorities believe that more than two raters split responsibility to the vanishing point. This opinion is supported by the belief that second and third raters do not register independent opinions, nor do they know, in most cases, enough about the subject to have worth-while opinions unless the rating in question concerns some member of middle management.

The seeming objectivity of multiple rating is more fictional than real, and for this reason often upsets the ratee who has good reason to believe that the second and third raters usually know very little about his job and less about him. There appears to be no acceptable plan at the present time by which multiple raters have access to sufficient knowledge of the ratee and his job to render really independent judgments. In those few situations where this is the case, the multiple opinions are certainly worth while. In actual practice, we are still far from accomplishing this ideal.

A relatively few companies rate by committees. There may be a management committee, or a joint committee representing management and the union. While this joint evaluation may tend to minimize bias in some cases, it will surely increase the number of compromises and consequently split responsibility and make the approach less scientific. To the extent that economic pressures exert influence on either side, the scientific approach to service rating is largely perverted.

Size of rated group

There should be a limit to the number of employees evaluated by each rater. If the rater's load is too heavy, his main job suffers, and many of his ratings will not be dependable. The actual number of ratees who represent a fair rater's load depends on the number of traits or factors to be appraised and the degree values involved. In the long run, the question of the rater's ability to handle his allotment of ratees will be resolved by the appraisal of ratings, assuming that the rating procedures make provision for this type of checkup.

Frequency of rating

Most ratings are made on an annual or semiannual basis, although there is no generally accepted pattern. New employees should be rated more frequently the first year, particularly during their probationary period. Since wage adjustments and promotions may be dependent on service ratings, frequency of the rating should be tuned to coincide with the wage adjustment periods. There is also the question of whether all employees should be rated at the same time. Although simultaneous rating is the rule, there are good reasons for staggered rating periods. When the ratings are staggered, the supervisor is able to give more time and attention to rating each case and to talking over the reasons for the final rating with each subordinate. It is also likely that staggered ratings cause less friction among employees, especially while the plan is not generally accepted.

Appraising the ratings

Poor ratings are worse than no ratings. They are worse than useless because they are morale destroyers. It is not an easy matter to check the accuracy of ratings, owing to the lack of standards. We have already pointed out in our discussion of testing candidates for employment that there are two criteria for evaluating tests or ratings — validity and reliability.[7] Any service-rating plan must be examined on both these counts.

Ratings are said to be *valid* to the extent that they actually measure the things they are supposed to be measuring. Validity is best established by comparing rating results with the employee's performance on the job. If the record shows that one employee's performance is significantly better than another's, this same difference should be reflected in their respective service ratings. Because many rating forms include psychological factors, performance is not a completely satisfactory check, but it is probably the best measure we have at the present time.

Reliability is a measure of the internal consistency of a battery of rating items. One test of reliability is made by comparing the estimates of two or more independent raters of the same employee. In this case, independence means without consultation and on separate records. Near or identical ratings by independent raters, it must be remembered, measure only the consistency of the ratings, not their validity.

Training the raters

Most of the raters' poor results come from not understanding the rating factors or the system used. That deficiency can be overcome by proper training, for which the conference method has been used most effectively. After the raters have studied their written instructions, they should meet in groups to be instructed in the over-all features of the system and its practical details. The final step is the question-and-answer period.

---

[7] See Chapter 20, pp. 395–396.

Effective rating is possible only after analysis of all the rating reports. Only then is it possible to observe differences in rater evaluations and plan for better common understanding. Possibly the most common weakness in rating is the phenomenon known as the "halo effect." This is the tendency, when rating a person on one particular attribute, to be influenced either by the rating that has already been given the person on some other attribute or by the rater's general impression of the person. One way to circumvent the halo effect is to have each of the relevant employee attributes rated by a different judge, but this is obviously a cumbersome procedure and rarely practicable. Furthermore, since the employee's immediate superior is likely to be his most important rater, on the grounds that the supervisor is the one who knows him best, and since the supervisor will always be susceptible to halo rating, perhaps the best that can be done in a training program is to call attention to this natural psychological tendency so that the supervisor may be aware of the danger and try to minimize its effect.

The professional analyses of ratings furnish the material for further group discussions, led by the trainer. They should also lead to the correction of specific error tendencies of the raters.

Conclusions

1. The halo pressure for subjective ratings is doubtless the chief defect of raters, and hence of ratings. Unconsciously pressured by this tendency, the rater places the worker in a fixed groove — high, low or medium — and rates him accordingly.

2. Another common defect is to give too large a percentage of "excellent" ratings. This tendency is so pronounced in some organizations that the system requires the raters to write justifications for all "excellent" grades. There are two outstanding reasons for this exaggeration of "excellent" ratings. First, the supervisor is convinced that most of his workers are good because he trained them. Second, he has found out from experience that the worker who is rated high will not give him any trouble or register appeals.

3. Different raters naturally use different standards in spite of the detailed instructions for rating.

4. The difficulty of rating fairly the worker who performs different jobs for two or more supervisors is almost insurmountable.

5. Poorly drafted rating forms cause many rating failures. This defect usually arises when amateurs copy forms not suited to the conditions under which they are to be used.

These and other defects frequently cause the distribution of service ratings to be the signal for general employee complaints, for a period of lowered quality and quantity of work, and for a series of service-rating appeals. A high proportion of appeals from service ratings is not a measure of democracy in management, but rather an indication of poor administration of improperly constructed rating forms. The whole area of service ratings is one phase of management where we have a wide open field for improvement.

QUESTIONS

1. What is the distinction between job evaluation and service rating?
2. Of what value is the making of service ratings to the rater?
3. What uses are made of service ratings with respect to the ratee and his job?
4. How would you use rating results as an aid in recruiting?
5. What three steps are required in building a good rating plan or system?
6. What factors would you select for measuring and rating the services of a salesman in a department store?
7. How often should service ratings be made in a large office group? On what reasoning is your judgment based?
8. Do you favor staggered ratings? What are the advantages and disadvantages?
9. There are still differences of opinion about showing employees their service ratings. What reasons would you suggest for opposing the idea?
10. To what extent are rating results improved by increasing the number of raters to three for each ratee?
11. Which rating scale or system produces the most objective results? What technique or procedure would you recommend for increasing the objectivity under any rating system or plan?
12. What is your opinion of self-rating?
13. Why is the forced-choice rating plan considered objective?
14. How would you appraise the value of a service-rating system?

CASE PROBLEM

THE CENTRAL REGISTER COMPANY

The Central Register Company is an old concern and a leader in its line of business. Because its management is progressive in its attitude toward new ideas, techniques, procedures and machines, the company is considered a leader in espousing the principles of scientific management.

Central Register was one of the first companies in its field to install a merit-rating system for its office workers of whom there are about three hundred. Of this number about 80 per cent are women, scattered throughout the ten well-defined sections into which the general office is divided. Due to the company's well-planned employee policies, office worker turnover has been well below the average. In fact, some thirty of the office workers belong to the company's Twenty-Five Year Club.

The check-list rating system has been used for about five years. It was designed especially for the local situation, and in an effort to make it as comprehensive as possible, fifteen factors are used. The double rating plan provides for evaluation of the ratees by their immediate superiors and by the general office manager. All employees are shown their ratings, which they are encouraged to discuss with their supervisors. The system provides for seven final grades, based on points assigned to the fifteen rating factors. The seven grades are: superior, excellent, very good, good, fair, below par, and unsatisfactory.

The plan provides for employee appeals from their rating grades, and a comprehensive form is provided for that purpose. The appeal board consists of three of the ten supervisors, with annual terms. Members of the board are appointed by the general office manager on a rotating basis.

About three years ago the percentage of superior and excellent grades started climbing until they now comprise about 60 per cent of the office force. Several of the section supervisors are jealous of the other section ratings, which show a higher average than their own. In addition, the number of ratee appeals has increased by 300 per cent in the past two years. The appeal record shows that the original ratings have been upheld in over 90 per cent of the cases.

Ratings are made every six months. The past two ratings have resulted in a mild turmoil among the female workers. The accompanying office discussions and accusations include not only the disappointed ratees, but their friends as well, which tends to make the complaints appear objective. Within two weeks after the last rating, ten of the girls with "very good" ratings quit in a group because they were rated down from "excellent," a rating which they had maintained for two years. What downward ratings did occur were probably due to the general office manager's criticism about the poor distribution of the rating grades.

PROBLEM. The current rating situation in the general office has come to the attention of the executive vice-president, who has decided to do something about it. If you were engaged to study and correct this situation, what would you recommend, and why? What data would you accumulate to guide your decision?

CHAPTER 28 Training

We saw in Chapter 14 the hidden costs involved in management's failure to integrate the various maintenance activities into a unified, planned program. The case is much the same with training. Every company of any size must carry on some training activities, but the tendency of all too many firms is to train without a planned program. If there were any way to calculate the money lost through haphazard training methods, it would be seen that the added initial expense of carefully planning for a training program actually saves money for the company in the end.

Training, and the traditional seven years' apprenticeship, already existed in biblical times. A similar training period applied to indentured apprentices during the medieval period. The Industrial Revolution gradually reduced the apprenticeship to four years, which became the accepted rule until the CIO attempted to shorten it to "the time required to learn the job." It was natural that training for simple machine jobs should require less time than for handcrafts. The operation of some semi-automatic machines requires a still shorter training period. On the other hand, there has been an expansion in the set of skills required to be a first-class machinist or tool-maker today, and the length of the training period has correspondingly increased.

The need for continuous training and development of executives and supervisors (including foremen) is increasingly recognized. The desired skills of modern business management come from training as much as from experience. Good training includes the benefit of experience, which can usually be obtained at a swifter pace after training. Alert concerns are constantly trying to improve their executive and supervisory personnel, as well as their sales and production methods and facilities. The profit motive of business requires the highest competence from each individual, and training is the best guarantee that such competence will prevail. Even with the best of mechanical equipment and materials, some companies experience decreasing production with increasing wages. The fundamental cause can almost always be traced to the failure to utilize manpower potentials.

Machines are made to perform standard tasks, but the human resources on all work levels must be trained to produce effective results.

The further education of the existing managerial force is important, but the training of future managers in the increasing complexities of modern business and human relations is more important. Future executives must not only be properly trained for business and industry; but they must also have a broad education in economic principles to make them better able to comprehend changing business conditions, and withstand the strains which they entail. Improvement in this area will be recognizable when fewer executives have their careers ended abruptly, overwhelmed by the shock of economic surprises.

To do an acceptable job of coordinating his company's various activities the future executive must also have a more extensive grasp of management techniques and human relations. The fact that he has been successful in production, finance, purchasing or sales will not fill the bill. The point is that he will not have enough time to comprehend the activities of modern management by experience alone; most of that knowledge must come through training.

National legislation and court decisions have established the supervisor or foreman as a member of the management team. Such recognition on paper must be supplemented by training adequate for supervisory responsibilities. As has been pointed out in the chapter on the foreman, his position on the bottom rung of management puts him in constant contact with both upper management and the workers, a difficult position. Since the success or failure of any business depends on the over-all quality of its management group, the average ability on the foreman level is at least an effective measure of the entire group. It is important, therefore, that the foreman receive continuous training in elementary economics, human relations and the principles of management as well as in the techniques of his day-to-day operations. The successful foreman's club is a good expression of this new training. Not so long ago, it was the best bench hand who was considered the most likely candidate for foremanship. Today the expanding recognition of the importance of human relations in maintaining high levels of productivity makes it advisable to give careful attention to managerial ability in selecting foremen. Superior skills in handling machines and materials are no longer enough.

Training policies

Any training program should be built on fundamental policies as set forth by top management. Not only do the policies furnish a guide for those responsible for developing the program, but they make it possible to dovetail the program with over-all management policies. Furthermore, policy delineation is the logical first step in the formulation of practices for any phase of business activity. A typical statement of policy is the following:

1. All training programs must be based on demonstrable needs.
2. In general, worker training programs should be carried out during regular working hours. Exceptions must be approved by the Director of Training (or the Personnel Director in small concerns). Examples of exceptions are schooling of apprentices in theory, meetings of the foremen's club and executive training conferences. Such exceptional classroom and discussion meetings may be held in the evening, with or without pay as shall be decided by the supervisors of the personnel involved.
3. All training sessions shall be scheduled by the Training (or Personnel) department, and be timed so as not to interfere unduly with the production processes.
4. To secure the most effective use of trainee time and company objectives normal training sessions shall be limited to two hours per week.
5. Choice of training programs shall be made by supervisors of the trainee groups, with the approval of the Director of Training (or Personnel).
6. Assignment of plant training quarters shall be made by the Director of Training (or Personnel). Apprentice classes in principles shall be assigned to school rooms by the Supervisor of Industrial Training of the public school system. Executive and foreman training groups shall meet at such times and places as they shall decide.
7. All members of management shall give assistance in the training programs when requested by those directly responsible, at times which will not unduly interfere with company business.
8. Proposed training programs shall be submitted to the Director of Training (or Personnel) for suggestions and final approval. Proposals for training programs shall include an explanation of their need, together with the operating details for accomplishing the purpose intended. Such information shall include the course content, method of instruction, name of the instructor, and the trainees involved. Finally, the proposal shall set forth the means for measuring the results of the program after it is completed.
9. Each training program shall be charged to the department concerned, with the exception of executive and foreman programs, which shall be a general charge to training expense.
10. Employees on the operating levels shall be selected for training courses by their supervisors. Those not so selected may request inclusion by the Director of Personnel who shall base his decisions on the employees' records. All foremen shall be included in their training program, which shall be arranged in duplicating sessions when necessary to avoid harmful depletion of the supervisory force in the plant. Participation in the executive-training programs shall be at the discretion of the individual executives.

Policy guidance of this nature allows for opportunity to initiate training on the operating level while maintaining over-all control on the top-management level. In addition, sufficient guidance of operating techniques is included to insure general cooperation in the training program.

Need for training

In general, the need for training is continuous in all organizations, if only for refresher courses or conferences. However, there are some easily observable signs that suggest the need for training, most of which appear on the job in the shop or office. Some of these signs include:

1. The obvious lack of job techniques, poor methods, haphazard worker motions and planning, all due primarily to poor foreman supervision.
2. Failure to meet production standards if there are any, or customer shipping dates.
3. A high ratio of production rejects, which means lack of job training and consequent poor morale.
4. A poor safety record, which can also be traced to lack of job training and poor morale.
5. Generally low worker morale, which is always evident when the other conditions exist. Management is to blame when the worker does not know what he is doing, or the correct way to do it. Good morale also depends on the worker's knowing what quality and quantity of production is expected. Most important, morale can usually be measured by the competence of foremen, which depends primarily on their training, or lack of it.

Subjects for training programs

It is important to decide what subjects will arouse and maintain the interest of a group of trainees. Many concerns which have devoted time and expense to solving this problem have published their findings.[1] The general trend of training subjects is divided into three categories, to serve as many distinct groups — (1) executives, (2) foremen and (3) workers, including office employees. Subjects for executive training are either of a general management nature, such as finance, personnel, costs, sales, productivity and the like, or they may relate to specific problems of current operations. Worker training has to do with indoctrination in company policies and processes, or is aimed definitely at some trade for apprentices, or the techniques of machine operations.

The largest list of training subjects is found in the foreman field, which covers both management and worker subjects as well as those applying specifically to foreman activities. The following is a selected list of foreman conference topics:

Qualifications of a foreman
Organization principles
Planning and scheduling
Quality control
Safety practices
Merit rating
Company's future plans
Department budgets
Interpreting company policies
Care of tools and equipment
Worker morale
Work simplification
Time study
Cost analysis
Techniques of instruction
Inventory control

---

[1] Representative subject lists for foremen conferences have been prepared by the American Rolling Mills, Middletown, Ohio, the Metropolitan Life Insurance Company's Service Bureau, *Factory Management and Maintenance* magazine, the University of Illinois' Business Management Service, the Department of Manufacturers of the U. S. Chamber of Commerce, and many others.

Absentee problems	Worker incentives
How to reprimand	Opportunities for promotion
Job evaluation	The dissatisfied worker

Trainee Groups

Executive development

Training in the problems of management for executives is often a difficult undertaking. Most members of the executive group are enthusiastic backers of training for foremen and operating employees, but some feel that the progress they have made personally indicates that their own further development is unnecessary. Others convince themselves that they do not have the time, a reasonable proof of their need for some phase of management training.

Executive development may take the form of planned or unplanned conference groups at company headquarters, or with some outside association, along with the executive members of other companies. The American Management Association and the Society for the Advancement of Management are two organizations offering special and over-all programs for executive development. Such sessions may take the form of annual meetings or periodic regional meetings covering specialized branches of management. The AMA divides its executive program into seven divisions: personnel, finance, office management, production, insurance, marketing and packaging. Besides conferences in each of these fields, the Association supplies trainees with periodicals and publications specializing in the subjects covered. The SAM program operates largely through its scattered chapters which hold monthly dinner meetings, with talks on specific subjects, followed by general discussions.

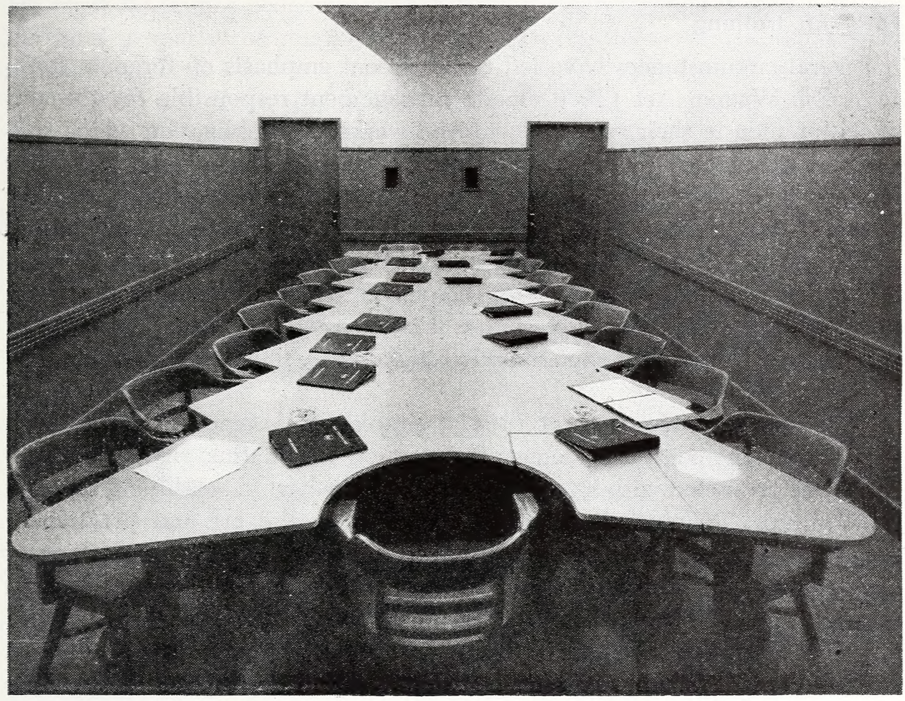
Within the past few years, a number of universities in metropolitan centers have been offering "institutes," or programs of lectures and seminars on subjects relevant to management. These sessions last for two or three days to as many weeks. Their purpose is to develop a broader point of view for their participants, as well as to introduce current material in government regulations and new techniques in the various fields of management. The institute sessions are usually opened by professors or other specialists who outline the subject under consideration, followed by general discussion based on the experience of the participants. The underlying objective is to furnish facilities for training in "coordination, logical processes of thinking, and in human, social, political and industrial values and vision." Short programs, evening courses or conferences are the ordinary vehicles for this type of executive training.[2]

---

[2] An outline of fifteen such courses is given in Earl G. Planty, C. K. Beach and Gordon Van Ark, "Executive Development Through Colleges and Universities," *Advanced Management* — publication of the SAM — Vol. 15 (December 1950), pp. 14–18.

FIGURE 28.1

Tree-Shaped Conference Table



Courtesy: Radio Corporation of America

Management development within the individual company invariably consists of discussion conferences on selected topics, frequently based on some current problem of the concern. These meetings are conducted by ranking members of management, and are open to all levels above the rank of foreman. Figure 28.1 shows a tree-shaped conference table used for executive development conferences by R.C.A. at its Harrison, N.J. plant. Its individual desk sections are equipped with separate spotlights for use with training films.

Many universities have adopted management curricula designed to train young men for future executive positions. Business executives are becoming increasingly interested in these groups, both as participants and as sponsors.[3] This type of sponsorship will doubtless hasten the development of cooperative plans, by which students of management will receive on-the-job experience with selected companies while they are still in college, probably extending their formal academic training beyond the conventional four years.

---

[3] In 1952, Alfred P. Sloan, Jr., Chairman of General Motors, donated $6,250,000 to the Massachusetts Institute of Technology for a new management school, of which Edward P. Brooks, former vice-president of Sears Roebuck, is Dean. See "Can You Teach Management?" *Business Week,* No. 1181 (April 19, 1952), pp. 126–130.

Foreman training

Several circumstances have led to the recent emphasis on foreman training. The Wagner Act (1936) made management responsible for the acts of its foremen in their relations with the workers, an obligation which suggested the necessity for instructing foremen in management policies. After the courts decreed that supervisors were not a part of management, the new foremen's union grew rapidly in numbers and power, resulting in the famous strike against the Ford Motor Company. Inadequate pay differentials between foremen and their workers helped convince the former that they were the in-the-middle group, neither fish nor fowl. It became clear that if management wanted foremen included in its ranks, something must be done to prove it.

When the Taft-Hartley Act (1947) established foremen as definitely a part of management, and denied them union negotiating rights, management was presented with an opportunity to do its part in solidifying the new relationship. Training programs for foremen in the art and practice of management grew apace. Foremen began to be consulted in the making of management policies and decisions. Besides these steps, pay boosts aided in establishing their managerial status on a more realistic basis.

The purposes of foreman training are primarily to improve production and labor–management relations, and to develop leadership qualities. While the technical phases of the foreman's work are emphasized, it has become recognized that the application of his technical skills is improved when supplemented with a knowledge of the basic techniques of human relations. The foreman is also expected to minimize costs, waste and worker turnover. This is a job which opens many opportunities for continuous training.

The Foreman's Training Needs. The foreman's primary needs are to improve his ability to plan, instruct and lead. This is a broad order which requires the coordination of many phases of training. The thinking of untrained foremen is necessarily based on their experiences alone. They need to learn that decisions can be based on reasoned conclusions from adequate analyses. They should be taught that the same analytical technique can lead to better planning. As with supervisors of all ranks, they need to know how to manage themselves and their subordinates to better advantage. They must learn the principles which guide the practical application of their work. Along the same line, foremen must become familiar with the entire organization of which their activity is a necessary part.

There is another, more subjective side to the foreman's training — that part which tries to make him feel that he has become a member and a representative of the management team, sharing the goals and values of the other executives. Acceptance of the foremanship demonstrates his ambition. Doubtless he has other ambitions for his job and for his home life. He must be taught economic and industrial fundamentals in order to understand properly the relationships of these subjective needs, and how to attain them.

There are also the technical details of his job, for which only continuous training on a planned basis will give him the progressive know-how necessary for attaining his shop ambitions. He must know his equipment, how it can be used most simply, how it is related to floor space and over-all production, and he must be familiar with the established system for handling materials. Record-keeping, power utilization and safety are becoming more necessary among his duties. And finally, the principles involved in the successful handling of the work force are increasingly demanded as his subordinates develop group loyalties within and outside the company boundaries.

Methods of Foreman Training. The great bulk of foreman training is done by conferences under the auspices of the training or personnel department, or at meetings of the foreman's club. Training methods are similar in either case, and will be discussed shortly. Some companies send selected foremen to special short college courses for supervisors. Occasionally a large concern, or the local chapter of the Foreman's Club of America, establishes a series of weekly lectures, followed by discussion periods. When these series are set up by the foremen's clubs, their trainees are drawn from a number of companies, something which greatly enlivens the discussions.

Important supplements to formal training programs are the literature and magazines designed especially for foremen. One of the very useful services which these publications perform is the supplying of information on labor relations. Labor laws are explained and illustrated with case material, and suggestions are made about what the foreman should and should not do in this difficult field.

During the First World War, when the need for foremen was pressing, the *conference* was found to be the best available method of training large numbers in foremanship in a short time. Since 1918, the further development of the conference technique has established it as the most successful of all systems in the quality of its foreman training. It is now almost universally preferred to other educational plans.

Conferences are usually spoken of as "controlled" or "uncontrolled." The former is conducted with planned procedures and objectives; the latter is likely to develop into a "glorified bull session." The chief advantage of the conference is its development of a critical or questioning attitude, and the ability to analyze situations. The controlled conference analyzes problems, assembles and studies facts connected with them, both pro and con, discusses the advantages and disadvantages of proposed solutions, and frequently tries to arrive at a group opinion.

The degree to which the conference stimulates thought and interest among the trainees depends largely on the caliber of the conference leader, and on his ability to plan the material and physical details of each session. The thinking through of typical problems, rather than memory work, should set the tone for these conferences. The foremen already know what kinds of problems arise on the job. They are seeking solutions. Because the solutions arrived at through the conference method are the product of group thinking, reflecting the attitude of all the participants, the individual foreman automatically gets experience in listening to and weighing the opinions of others, and emerges from these sessions with a more rational, less opinionated approach to his managerial role.

The successful conference requires:

1. A qualified leader
2. A carefully selected group
3. A number limited to the purpose
4. Sessions of definite length
5. A regular schedule of meetings
6. Adequate conference-room facilities
7. Well-prepared outlines and materials
8. Problems of direct interest to the group

The *conference leader* should be just that — not a teacher or lecturer. As we have said, the memory period for the trainees is past. They have plenty of problems; they are now interested in knowing how to think through to answers. They need leadership in the training process, which means that someone must prepare the problems, materials and meeting place, and then act as conference chairman, guiding the discussion, keeping it focused on the problem at hand, encouraging everyone to contribute, but keeping his own opinions well in the background. To stimulate and control group discussion, the leader must prepare interesting problems (case studies) and assemble facts and plans of action to implement them. In many cases, demonstrations through the use of charts, graphs, diagrams, films and blackboard work will highlight the problem and make it come to life.

Finally, the conference leader must be alert to differences in personality among the conferees and know how to deal with them. There is the "know-it-all," who insists on talking and imposing his opinions on the group. Another type wants to argue, especially if he thinks he can "stump the expert," which the leader is not. Still another resents the general situation in the belief that someone is telling him how to run his job — something he is certain he has known how to do for a long time. And finally there is the shy individual who must be unobtrusively led into the discussion. All of these situations require conference leadership ability rather than a profound knowledge of the subject under discussion.

Worker training

Training programs for workers are addressed to more specific objectives than programs for executives and foremen. But simply by virtue of this greater specificity, there is also a greater diversity of topics. The four-way classification of *induction, vestibule, on-the-job* and *apprentice training* encompasses most of these many specific training topics.

Any worker training should have in mind the general and basic desires of employees, because instruction programs, irrespective of their subject matter, will be more effective if personal incentives play a background role. The employee who wants to advance on merit is interested in assuming responsibility and working at full utilization of his ability. Encouragement gives him a feeling of importance no matter how menial his task. He wants his desires and accomplishments recognized and understood; he wants his foreman to take a personal interest in him. All of these considerations should be implicit in planning and carrying out any training program for workers.

Induction Training. The aim of induction training is to make the new worker feel at home in his new environment. It tells him about his rights, privileges and duties in his new group relationships. He is told about the history of the company and its products, and often taken on a tour of the plant with other new employees. The location of the rest rooms and the cafeteria should be pointed out. Medical, financial, social and recreational facilities for employees should be reviewed in detail. Company rules and regulations are explained, and finally the worker is told to whom he can talk when he has company or personal problems for which he wants advice.

Vestibule Training. This is given before the worker goes on his regular job. As the name implies, vestibule training is received outside the regular production or work area. If machine operation is the work involved, the worker may be trained in a separate room, with other vestibule trainees, on the machine in question. Vestibule training is mostly concerned with production processes, but it can also be applied to various types of clerical, or even industrial laboratory work. One purpose is to make sure that the worker will receive instruction from someone who is adept at teaching, and under circumstances where he will not be embarrassed by the presence of regular workers who have become proficient at the task. Another idea involved in vestibule training is that it be directed specifically at some detail by a skilled instructor so that it can be mastered in a shorter time than is possible when learning on the job.

On-the-Job Training. The title of this plan explains its method. Apprentice training is also given on the job, but only in part. Whereas apprentice-training practice is done in the shop, the principles of the trade are more often learned at a trade school. On-the-job trainees learn both the theory and practice at their benches, from fellow workers who have already mastered the job skills required. Usually the actual training under this plan is done by a fellow worker at the next bench, or by the foreman. Only occasionally are regular teachers assigned for this type of training. Under most shop conditions the foreman is too busy managing his group to do effective teaching, and the proficient worker at the next bench is not always pleased or qualified to do a good training job.

On-the-job training is favored as a general practice by those who feel that the time spent in learning principles elsewhere than on the job is largely wasted, or by those who feel that the other training methods are too expensive. It cannot be of a general nature, but must be applied to specific types of jobs. The measure of training values against training costs is the real test.

Apprentice Training. This has a long and interesting history. All through the medieval period regulations for apprentice training were detailed and strictly enforced. Apprentice training covers, in a four-year period, the principles and practice of the recognized skilled trades. On completion of apprentice instruction, the trainee becomes a journeyman, or worker qualified to practice his trade. For several centuries, apprentice training was regulated and controlled by the guilds, whose functions were later taken over by the unions. Of recent years, the federal and many state governments have been interested in establishing apprentice training on a higher level, by suggesting programs and issuing certificates of proficiency. A number of states have inaugurated graduation exercises, with speakers and state officers in attendance.

The essential difference between apprentice training and the other three forms is in its breadth and the fact that it covers both principles and practice. For example, the trade of foundry molder or core-maker is made up of a number of operations, for some of which a person may be trained under the vestibule plan in a short time. This plan is often adopted in war emergencies, when skills are diluted so that the work force may be expanded rapidly. The journeyman of the foundry trade not only can perform all phases of making cores and molds, but he also understands the relationships and sequence of operations, and the various methods and tools to be used for securing specific results.

Training Materials

Training materials consist chiefly of lectures, printed matter, case studies and visual aids. The *lecture* may take many forms, and as an explanatory device it is necessary in most training plans. In its elongated and pristine form, without provision for questions and answers, or discussion, it is not usually desired by executives or foremen, and is not particularly effective with the workers. Short lectures to introduce a subject for training purposes are well worth while.

Printed materials are as effective as the subject matter and presentation are appealing. Specially prepared printed or multigraphed material, useful for the following session, may be used to better advantage when it is distributed at the end of the current session. Explanatory outlines are often used to give trainees an over-all picture of a series of conferences, to afford an opportunity to see the beginning and the end, and the objectives as illustrated by all of the training materials. This is a good teaching technique in general, since almost all students want to know in advance what the course is going to include. So-called "canned" materials, published by concerns specializing in the field, are often valuable aids when used as a background or when directly related to the main subject matter. Such aids are most valuable for foreman training on a continuous basis. The best way to test their value is to give them a tryout, asking the trainees to go over them carefully, if only for the purpose of voting whether they shall be continued. This is the acid test, and besides it makes for group participation.

Cases are used in many forms of training to illustrate principles and to promote discussion. Frequently, the discussion leader or training instructor uses cases involving company or production situations to illustrate his problem and develop the principle on which its solution is based. Whenever possible, cases should be taken from company affairs or operations, but they are not very valuable unless they emphasize some principle.

Films, and the entire field of visual aids to education, have been growing in popularity. However, it must be understood that visual aids are only aids. Unless the instructor relates them directly to the principles and problems under discussion, they become merely entertainment, or worse. The training value of visual aids depends on the subject, the quality of its presentation, the skill of the training instructor, and the receptivity of the trainees. Visual aids are neither worthless gadgets nor the ultimate for training purposes. They will not take the place of an instructor or change a poor program into a serviceable one.

A number of public school teachers were asked to evaluate visual aids from several standpoints. They found that student interest was increased by 40 per cent, understanding of the subject presented by 25 per cent, and information retained for a year by about 35 per cent.[4]

The chief visual aids are motion pictures, slides, strip slides, and opaque projections. The last three types may be used to show diagrams, photographs, charts, drawings and cartoons. The motion picture serves best where action is involved, as in office, sales and production processes. It is also used effectively in portraying morale-destroying and morale-building situations, where the subject matter is enlivened by the action and dialogue of the principals.

Slides are useful when arranged in sequence to show the steps of development of a process or situation, and to inject explanations of varying length for illustrations. Although they do not illustrate motion, they can be used to concentrate on individual scenes for indefinite periods.

---

[4] Richard R. Tryon, "Visual Aids in Employee Training," *Factory Management and Maintenance,* Vol. 103 (March 1945), p. 111.

Strip slides are simply individual slides arranged in sequence on a continuous film. They eliminate the possibility of showing pictures out of order or upside down. They are also more compact and therefore easier to store and use. Strip slides are often synchronized with oral explanations or background music.

Opaque projections can be made from photographs, charts or other materials from books or magazines. Multiplicity of available sources and ease of projecting are their chief virtues. Their limitations are the degrees of darkness required for good visibility, and the restricted distance which they can be projected. Opaque projections are often made directly from original drawings in explaining assemblies, and for other purposes. Figure 28.2 is an isometric drawing used for training by one of the large aircraft companies.

Visual aids are particularly serviceable for nonsupervisory employees when used to familiarize the learner with machines, methods and materials. Figure 28.3 shows a worker engaged in a typical assembly operation; because of the complexity of this particular process, the worker completes her job with the aid of a graphic chart. Visual aids add speed, vividness and interest to the preliminary instruction period. It must be emphasized again, however, that they do not take the place of the instructor. Besides demonstrating how machines, methods and materials are used, proper visual aids will also show the *why* of these three phases of training — that is, they will show how the specific operation being demonstrated fits into the total

FIGURE 28.2

Isometric Drawing for Assembly Operations

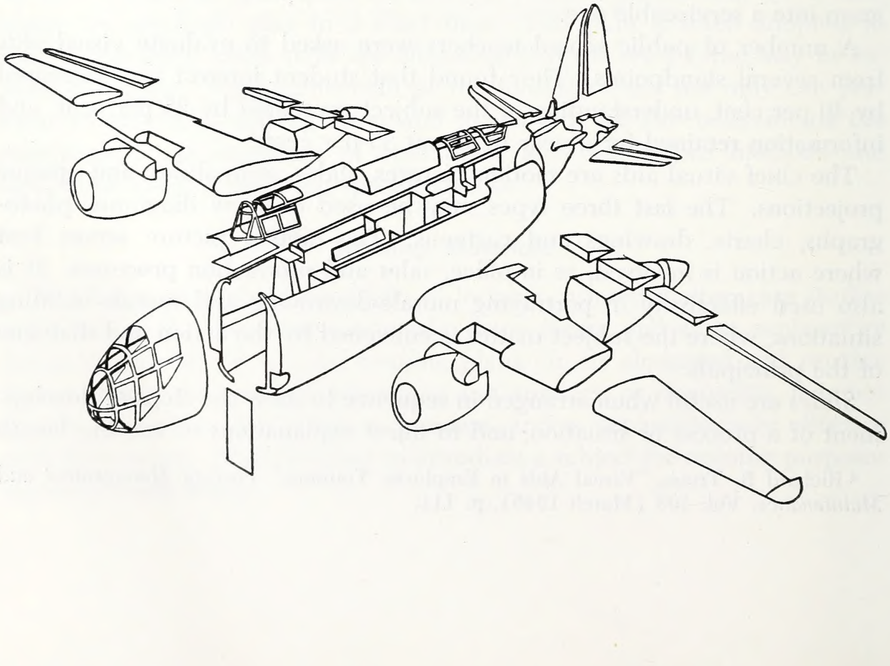
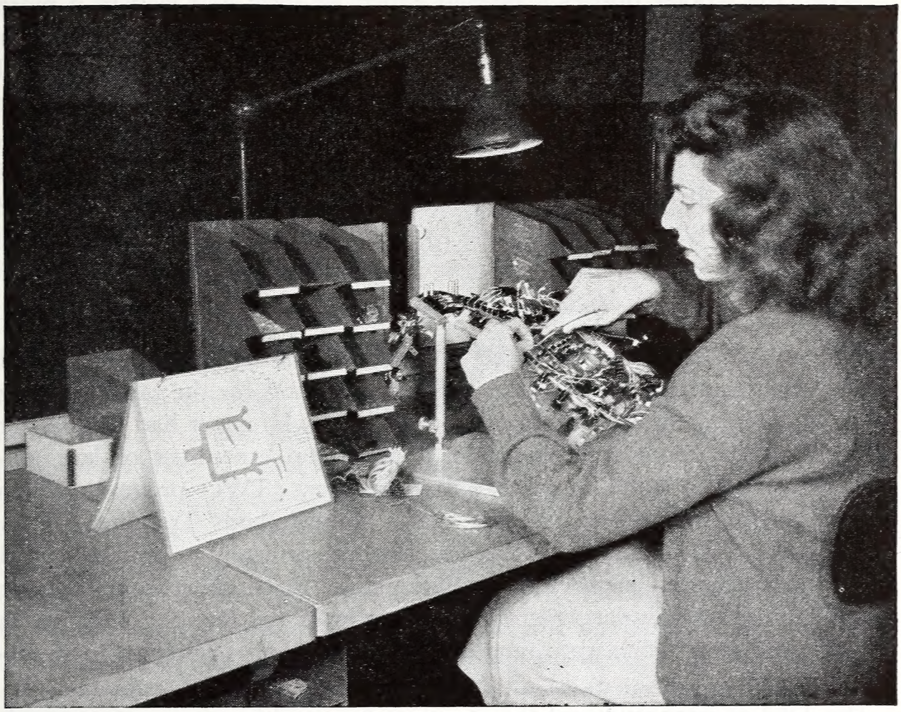


FIGURE 28.3

A Simple Training Aid



Courtesy: AC Spark Plug Division, General Motors

pattern of production or office work. This last aspect of training helps establish the importance of the workers' jobs. To give the trainee the actual feel of parts of the machine or the materials used, these parts and materials may be passed around before or after the picture is shown. When visual aids are used, they help with the "presentation" of the subject, which is preceded by "preparation," and followed by "performance" and "follow-ups" for the purpose of checking on the degree of trainee comprehension, and giving further explanations when necessary.

The promotion chart

A complete, well-publicized promotion chart stimulates the employees' use of company training facilities. It may even be a factor in the recruiting of desirable new workers. The promotion chart displays the types of jobs horizontally and their wage and salary ranges vertically. Horizontally the chart should be divided into departments with the various jobs arranged in a descending scale according to wage or salary levels. The chart tells the employee at a glance how he can progress within his present job classification, or by transferring to some other classification within his department or in some other department.

When the worker desires a change which he feels will lead to a more profitable future with his company, he is advised to consult his foreman or the personnel department to find out what additional preparation he will need to qualify for the change. Following out the recommendations, he enrolls in some training program, within the company or on the outside, to prepare himself for the opportunity he seeks. In view of the results obtained from these charts, it is surprising how little attention is given to them by most concerns.

Government Training Aids

The pressing need for improved productivity during the Second World War caused the federal government to sponsor plans for the rapid training of the many new foremen required and of those who never had the benefit of formal instruction in foremanship. Several top executives of large industries worked out the Training-Within-Industry (TWI) program, which includes — Job-Instruction Training (JIT), Job-Methods Training (JMT) and Job-Relations Training (JRT). Prepared scientifically to produce speed and effectiveness in supervisor training, these three short courses were given to progressively larger groups until most of the foremen engaged in any phase of war work were taught how to use their principles in supervising workers.

The TWI courses represent the essentials for good foreman management, and were so successful that they have been continued by many companies since the war. The Job-Relations Training course, for example, boiled down its program into four principles: (1) get the facts, (2) weigh and decide, (3) take action and (4) check results. That course was built around these four steps for action, and was presented to small groups of foremen in conferences. The JIT course was developed to improve the foreman's training of his workers, and the JRT course, to improve methods by analysis and simplification of the jobs in his department.

Another government-sponsored training program was known as the "Engineering, Science and Management War Training" (ESMWT). Carried out for the most part through the cooperation of evening and extension departments of established universities, the program included such subjects as drafting, metallurgy, production control, work simplification and methods engineering, besides many special subjects to take care of local industry needs in general, and personnel management in particular. The war emergency was also responsible for the intensive development of apprentice programs by the federal and many state governments.

New York State's Industrial Service Bureau offers industrial training services through the state's Department of Education without cost. New York State also trains the physically handicapped for specific jobs in all forms of business and industry. Several other states supply similar training facilities. Ohio has trained the blind to work in industry, particularly on some foundry jobs for which they are ordinarily thought to be incapable. Under the guidance of instructors paid by local school boards, and in cooperation with the Ohio state educational board, students receive training for jobs in business and industry according to proven procedures worked out by the municipal universities in Cincinnati, Toledo and Akron. Since these programs are tied in with the state's guidance of apprentice training, they often influence students not to leave high school before graduation, for unskilled jobs. The U. S. Office of Education usually has funds available for distribution through the states to aid in industrial training programs.

Training Costs and Results

Training costs are flexible, depending on how the company sets up the charges involved, and the extent to which the program receives aid from public agencies. It must not be thought that "free" training by public agencies, federal, state and local, necessarily means that the companies will have no expense. There are always overhead costs, most of which can be calculated in advance. Whether the instruction is at company or public expense, costs will be influenced by whether the trainee is to be paid while he is learning, and if not, whether the time will be charged against him for actual class periods or for the entire period of absence from his job. If the trainee is to be paid for instruction time, how will his pay be affected by overtime?

In determining training costs in advance, the company should find out what instruction and training aids can be obtained from public agencies. Visual aids, for example, may be had from the U. S. Office of Education. Large sums can be saved by an alert training director who makes use of the several excellent public training services.

Many companies are employing college graduates to whom they give from a month to two years training, with pay, before placement on productive jobs. This plan must be practical, otherwise it would not continue in operation year after year. However, *Business Week* published the results of a survey which pointed out that "college trainees who didn't make the grade cost 247 companies $1.3 million" in wages and training expenses. The article went on to say that the probable reason was poor selection of candidates. The median cost for each unsuccessful trainee was $2750 per year.[5]

Is the training program worth while? This question involves a comparison of costs with results. For companies with adequate accounting methods, finding the answer should not be too difficult. Another question that receives much less attention is this: how can the results obtained from experience with training at different times and by different methods be used to arrive at the optimum time and methods? Some studies have shown conclusively that some training programs were unnecessarily extended. The same, or sometimes even better, results came from shortened programs. When several different training methods are used to accomplish the same purpose, an analysis of student opinion at the completion of the course may often determine which plan was most successful.

---

[5] "Costly Collegians," *Business Week*, No. 1004 (November 27, 1948), p. 30.

Conclusions

Probably more emphasis is placed on methods for instructing supervisors in human relations than on any other phase of training. Training literature continually expounds the basic values of good human relations and the approaches for stimulating them. Human relations emphasizes the art of dealing with people in such a way that they will want to do the things expected of them. It reaches its highest achievement in a successful combination of individuals engaged in a group effort.

All companies train their employees. The paramount question is whether to train according to an orderly plan, with tested techniques and recognized aids, with capable instructors, or by haphazardly turning the new worker loose on his job location to find out for himself, trusting to the mercies and intelligence of those who found out the same way. To contend that the "hard way" is more effective and less expensive is simply driving blind in unfamiliar territory. The successful training program must be based on these essentials, and should generally be scheduled in the order listed:

1. Establish the need for training
2. Determine the objectives of the program
3. Sell management on the value of the program
4. Adopt sound training policies
5. Fix responsibility for the training program
6. Select and train competent instructors
7. Plan the program and announce its schedule
8. Sell the value of training to the employees
9. Evaluate the results of the program
10. Report progress and final evaluation to management

QUESTIONS

1. How would you determine the requirements for a training program in methods for foremen?
2. What factors or items should be included in a training policy manual?
3. What are some of the observable signs that suggest a general need for training programs in shops and offices?
4. What is the general nature of subjects usually selected for executive training?
5. Why is it frequently more difficult to carry on a program for executive development than it is for foreman training?

6. Why is the conference method the best plan for executive and foreman training?
7. What is the primary purpose of foreman training, and what are some of the subjects used to accomplish that purpose?
8. What are the outstanding requirements for successful foreman conferences?
9. What are the chief advantages of vestibule as compared to on-the-job training for workers?
10. To what extent, and why, do you think that apprentice-training programs will be shortened in the future?
11. How is the isometric drawing used as a training aid in assembly operations?
12. What are some of the other training aids, and what are their specific purposes or uses?
13. What types of training aids are furnished by the federal and many state governments? In particular, what has been the extent of influence on industrial foreman training resulting from the well-known TWI programs? To what fields of foremanship do they contribute?
14. How does the promotion chart stimulate worker training?

CASE PROBLEM

Acme Products Company

The Acme Products Company enjoyed a slow but steady and fairly profitable growth in the foundry, machining and engineering fields for forty years before World War II. It maintained excellent facilities for engaging in these allied lines in a small industrial city, from which it obtained most of its 100 semiskilled and unskilled workers. A minority of the company's 200 skilled workers — machinists, tool-makers, core-makers and molders — had learned their skills under company auspices in on-the-job and apprentice training groups; the majority were recruited as journeymen from large industrial centers. Replacements for the engineering staff were always drawn from other cities or engineering schools.

Before the war, Acme's well-equipped shops supplied high-quality, special-purpose production machines to various classes of industry, and relatively expensive equipment for experimental purposes to several branches of the military service. More than 70 per cent of Acme's orders were for single pieces of equipment, with occasional orders for spare components. Its only production work, which was a small part of its dollar volume, came from foundry operation in the form of comparatively cheap iron castings made from sand molds.

The war expanded all lines of the business, but particularly those which required engineering and tool-making skills. For most of this work, Acme acted as subcontractors to concerns engaged in direct war work. The foundry started to make some aluminum and brass castings for the first time. The expansion of its plant and work-capital requirements were financed through brokers, diluting the equity interests of the older stockholders. By the end of the war, Acme's sales and investment in physical facilities had increased about fivefold.

As it became evident that the war was drawing to a close, with approaching prospects of contract cancellations, the management and directors became acutely conscious that their expanded facilities would become a financial burden unless they could find some new line of business. It was decided to shift, if possible, to a production basis. After a thorough canvass of the possibilities, plans were started for the production and sale of electric washing machines. It was realized that the field had been fairly well supplied before the war, and that one or two of the large producers had encountered financial difficulties. However, Acme management felt that with refined engineering techniques and the latest production facilities, it could get a running start on the pent-up demand that had accumulated during the war.

Feverish activity in engineering, pattern, aluminum materials, design and the development of sales programs preceded the end of hostilities by several months. Several working models were made. From the study of these models it was decided that many of the aluminum parts could be made better and with lower unit costs by using permanent molds of steel instead of the sand method. Permanent molds were very expensive, and because the process was more or less experimental, it might be difficult to recruit men with the necessary skills for operating them. However, the new type of mold operation could use some semiskilled help, who would not require a long period of training. An entirely new crew of permanent mold operators, as well as several highly skilled supervisors would also be required.

It was planned to buy large punch presses for making the flat pieces. Some of the necessary machining could be done on new automatic equipment, for which skilled mechanics were already available, although they might not be interested in shifting to these jobs at the wage scales that the company could afford to pay in this highly competitive field.

An entirely new sales setup would be necessary since the new machines would have to be distributed through electrical appliance dealers. During the war, Acme's few salesmen, who were mostly engineers, were transferred to the purchasing Department because it was materials rather than orders that needed concentrated attention. The new product would also require a general sales executive experienced in setting up and operating a dealer-distribution organization on a national scale.

PROBLEM. Acme will undoubtedly have a real combination problem of recruiting and training personnel in the various skills required for industrial reconversion. If you were put in charge of training for this new production and sales plan, what kind of program would you develop? Outline your training plans and methods for the various types of new employees who you feel would need special training. Would you include any personnel from top and middle management in your training program, and if so, how would you provide for them?

CHAPTER 29 *Procurement*

The terms "procurement" and "purchasing" are still confused with each other in the field of management. Similar confusions are not difficult to find. For example, acceptance of a technical distinction between "management" and "administration" is neither general nor definite. Blurred meanings of various management terms stem from the comparative newness of scientific procedures in the field. Thus purchasing and procurement are used by different operators to mean the same thing, and they are used interchangeably by the same person at different times.

The two terms should be distinguished. Procurement is a more recent and more inclusive concept than purchasing. As the science of management developed, many important steps were added to purchasing, both before and after the issuance of an order to the vendor. This broadened scope of buying activities was referred to at first as *serialized purchasing.* Today, with the systematization of these before-and-after steps, a new scientific procedure has emerged, known as *procurement.* What has been added to the original purchasing activities can be summed up in the following scheme:

Procurement		
Preliminary Steps	Purchasing	*Subsequent Steps*
1. Requisition	1. Negotiations	1. Follow-up
2. Quality	2. Purchase	2. Receiving
3. Quantity	3. Payment	3. Inspection
4. Delivery		4. Storage
5. Vendors		5. Inventory
6. Routing		

Procurement Procedures

There are two basic distinctions in the methods of procurement operations. One is the difference between centralized and decentralized procedures, and the other is the difference between institutional and negotiated buying.

Centralized versus decentralized buying

Centralized procurement means exactly what the word signifies — a plan for buying all materials, supplies and equipment through a functional central office or department. There is a natural centrifugal force in buying. Department heads, foremen and even stenographers want to buy the things they use. It is inconceivable to them that a centralized buying department can do as well. Their beliefs are based on a combination of honesty and ignorance, but the former should not be allowed to excuse the latter.

Decentralized (department) buying within a single large business often leads to fantastic results. Random examples include a dozen kinds of carbon paper, fifteen different lubricating oils, and as many varieties of soap and pencils. Purchasing agents report the use of several brands of cleaning powder, each department insisting that its choice is the *dernier cri.* One newly centralized department reported that the price range for the different brands was too wide, and all the prices too high. It bought sodium phosphate ground fine, as a single substitute, at about one-quarter of the price of the brand-name items. The containers were labeled with a fictitious brand name. Worker acceptance proved to be general, and the home-made cleaner was subsequently used under its own name.

With decentralized purchasing, an unwarranted number of items accumulates in all departments. People change their minds about material, supplies and equipment. They decide to try out a new brand while there is still plenty of the old brand on hand, and an assortment of obsolete items is left lying around — to be sold on an unpredictable market or, sometimes, to be scrapped. Absence of centralized procurement, and the lack of standardization which invariably accompanies it, results in unnecessarily large investments in stocked items — the sure road to creeping obsolescence.

A legitimate form of decentralized procurement is that applied to scattered plants, offices or institutions operated from one central location. The combination of centralized and decentralized procurement is often advantageous under such circumstances. Large corporations with scattered operations frequently decentralize the procurement function for most items while retaining buying power at the home office for items in common use at all the branches. This plan provides for price advantage on large-scale purchases, while leaving room for initiative in buying many more specialized items at the decentralized offices.

The chief advantages of centralized procurement are so obvious and easily understood that its lack of wider application is difficult to understand, except on the basis of personal interest. Among its advantages, centralized procurement:

1. Reduces unit costs
2. Reduces overhead costs

3. Reduces accounting work
4. Increases standardization
5. Improves specifications
6. Provides centralized inspection
7. Increases scientific testing
8. Provides for central storage
9. Promotes interdepartmental exchanges
10. Centralizes sale of obsolete items
11. Reduces inventory investments
12. Aids services of suppliers
13. Reduces the area of petty graft
14. Checks refunds for "empties"

Centralized procurement for public institutions has been characterized as the "sentry at the tax gate." For private business, the financial advantages of centralization are probably greater because of the larger possibilities of negotiated buying. Undoubtedly it has some minor drawbacks, but they are largely outweighed by the advantages for both industrial and institutional buying. As the general principles of scientific management are more widely understood and accepted, the coordinative possibilities of centralized procurement will be so firmly accepted that it will cease to become a subject for serious debate.

Institutional versus negotiated buying

Institutional procurement has one great difference from that of private business. An institution must request sealed bids from prospective vendors for all purchases above a fixed amount. This method is known as *formal,* as distinct from the negotiated or informal plan. Negotiated purchases are those made between buyers and sellers who are dealing at arm's length. They are subject to the "haggling of the market," and are often consummated on a give-and-take basis. The formal method, on the other hand, provides that all bids shall be sealed when submitted, shall all be opened at the same time in the presence of the bidders, and the award given to the lowest responsible bidder. The maximum allowed for negotiated bidding by public institutions ranges from about $500 to $2,000. The lower the maximum fixed by law, the less opportunity there is for negotiation by the institution's procurement department.

There are several reasons for sealed bids. One is to prevent cheating by the purchasing agent. Another is to give equal opportunity to all taxpayers who may happen to be suppliers. Both features can be, and usually are, accomplished by negotiated purchasing. The sealed-bid approach is negative in that its chief object is to prevent something undesirable from being done. The positive approach aims at doing the desirable thing in the best possible manner. Experience shows clearly that the several varieties of cheating, through political pressure and otherwise, are just as possible — and perhaps just as prevalent — under the formal system of bidding.

Institutional formal bidding is based on the historical assumption that the management of public institutions is necessarily incompetent, with the result that prevention of dishonesty is emphasized. Methods of control have advanced considerably since sealed bids were made compulsory for most institutional buying. This lingering technique from the past is a slur on the mental ability and personal honesty of buyers in the institutional field. And — what most taxpayers do not realize — it is often more expensive.

Those opposed to negotiated buying for public institutions base their argument largely on the contention that "all taxpayers must have equal opportunity." In answer to this, one might well ask whether taxpayer-sellers have selling rights superior to the buying rights of the taxpayer-buyers.

Procurement Responsibilities

The responsibilities of procurement are divided, on an operational basis, into three general categories: (1) the basic duties of buying; (2) opportunities and decisions which procurement shares with other departments; and (3) controversial responsibilities which some procurement agencies have assumed.

Basic Duties

1. Develop sources of supply
2. Interview suppliers' representatives
3. Visit plants of suppliers
4. Get quotations and conduct negotiations
5. Select the supplier and make award
6. Handle rejections and adjustments
7. Prepare schedules of requirements
8. Sell scrap, surplus and obsolete items
9. Comply with governmental controls

Functions Shared with Other Departments

1. Decisions whether to make or buy certain items
2. Purchase of capital equipment and construction
3. Development of standards and specifications
4. Purchasing research
5. Inventory control

Controversial Responsibilities

1. Inspection
2. Stores
3. Salvage
4. Traffic

Since most of these activities are self-explanatory, only a few will be discussed. It is impossible in a treatment of this nature to go into details of procedure for all duties of the procurement department.[1]

Basic duties

Developing and selecting the sources of supply is sometimes referred to as the most difficult job of the purchasing agent. For locating sources he refers to trade journals and directories, industrial advertising, catalogues and salesmen. Salesmen are frequently the best source, even when the salesman is not handling the particular item sought but is familiar with the field in general. Selecting the best source, everything considered, is the end-product of buying.

Interviewing salesmen, even those with whom there is no prospect of doing business, is part of the common sense of procurement. Very little that the purchasing agent reads is of equal quality, or as timely as information gathered from salesmen. The same may be said of information which the salesman receives from the purchasing agent. The fact that they both know this accounts in large measure for their mutual helpfulness.

Visits to suppliers' plants are also mutually advantageous to both parties. Visits may serve to fix the purchasing agent's confidence in the supplier. They may also lead to helpful suggestions by the purchasing agent, acceptance of which will more firmly cement relations between vendor and vendee.

Selecting the supplier involves so many things — financial ability to perform, quality, price, service, delivery, packaging, willingness to negotiate differences in a spirit of cooperation — that the decision is sometimes baffling. This subject is discussed as a major policy decision on page 582.

Preparing schedules of requirements necessarily involves dealing with the production and other departments, many of which are skeptical of their relations with procurement. The idea of a centralized purchasing department is not old enough to have received the universal or complete confidence of the operating departments. The representative of procurement must not only have considerable knowledge of the specific fields of company interest, but he must be a diplomat in his dealings with other departments.

Sale of surplus and obsolete items involves the question of whether or not they really are surplus or obsolete. There may be an honest difference of opinion, which is not easy to resolve. Furthermore, many production men are not convinced that procurement knows enough about their requirements even to buy for them intelligently — much less sell their surplus obsolete items at the best prices. Line operators have been taught that selling is a highly specialized function. How then, they ask, can this buying department also sell to best advantage?

---

[1] For detailed discussions in the field of procurement, reference should be made to standard textbooks on the subject. See, for example: Stuart F. Heinritz, *Purchasing* (New York: Prentice-Hall, Inc., 1951); and Howard T. Lewis, *Procurement: Principles and Cases* (Rev. ed.; Homewood, Ill.: R. D. Irwin, 1952).

Complying with government controls is listed by purchasing agents as their most trying duty when a long list of materials becomes critical in time of war or national emergency. However, this is a special situation and is not particularly disturbing to the procurement department in normal times.

Functions shared with other departments

Whether to buy or to make items used in production, or elsewhere, is a constant problem in many businesses. To buy on the outside fixes costs, whereas making involves direct and indirect materials and labor costs, as well as supplies and overhead. The cost uncertainties are eliminated by buying on the outside. Some concerns are so sure about the advantage of escaping both production headaches and the necessary investment that they buy most components on the outside and merely assemble. On the other hand, how can the buying company assure itself that the price is fair, and will remain so? What about assurance of scheduled deliveries? Then, too, the question of revealing to an outsider some secret process may be involved.

What stand is procurement to take about participating in such management decisions? Often its shaky prestige is at stake. Besides, production is less likely to admit procurement's competence in this field than any other. When the solution to this problem is not clear, it is considered good practice to make part of the requirements and buy the rest. This plan partially protects against delivery failures. It provides for the establishment of quality standards. It enables the buyer to learn something about costs, and offers the opportunity to work out improvements in machinery, methods and materials.

Inventory control is tied up with central stores. With proper cooperation, procurement may have a contribution to make in the effectiveness of this control activity. If procurement has jurisdiction over stores, as it frequently does, then there is naturally no problem of cooperation between the two; however, such an arrangement often gives rise to new problems in cooperation between procurement and the production department.

Purchase of capital equipment and construction is a top-management decision, but procurement can help in obtaining answers to problems assigned to it. In these associations, procurement usually finds closer cooperation on the top level than from middle management.

Standards and specifications are bound together. In this field, through research and negotiation, procurement probably has its greatest opportunity to demonstrate economic and social usefulness. Comparatively little was done to establish buying standards until the chief of procurement had worked his way to an established position on the top-management level. There are two areas in which buying standards must be developed — within a single company, and among various concerns in similar fields. The latter is the more difficult task, but it offers almost unlimited opportunities for savings.

A good example of the advantages afforded by standardized purchasing is in the field of commissary supplies for oil tankers. Unless regular crews have "good tables," their dispositions and productivity suffer. The purchasing agent has a direct responsibility for profitable results. If the food is poor there is trouble with the crew; if it costs too much there is trouble with management. Standardization of food purchases assures desirable quality, more potential suppliers, and minimizes friction with crews, management and vendors. One purchasing agent who had to grapple with this problem explains:

> We formerly ordered "cabbage, solid head." It was left to the vendor to define a "solid head" and no one knows how many pounds of unusable outside leaves were paid for at top price and thrown away. Now we order "cabbage, U. S. No. 1, white, well trimmed (maximum four wrapper leaves)." Corn beef was formerly just plain "corn beef." Did we get brisket, top round, or bottom round? Now we order, "beef, corned, bottom round, from U. S. commercial cow, packaged."[2]

The trade knows what these orders mean because they are expressed in terms of commercial standards which have been worked out on an industry-wide basis.

Storage tanks present another example of the virtue of standardization. Until recently each company's engineer wrote individual specifications. Tank manufacturers had to carry large stocks or make customers wait, and they did some of both. Tank users report that since standardization, this item can be bought "off the shelf." Literally hundreds of such examples could be cited.

To reduce to a minimum the resistance of using departments in accepting standardization, both common sense and technical skill are necessary in selecting the new commodity, which should approach as closely as possible the quality, make or size most commonly used throughout the service.

The National Bureau of Standards of the U. S. Department of Commerce offers the greatest assistance in commodity buying to both private and public institutions. The Bureau's experience with the purchase of vast quantities of supplies by the federal government, as well as its research work in support of that program, peculiarly fits it to help in the formulation of standards, in writing specifications, and in determining the best methods for testing. In 1925, the Bureau issued the first edition of the *National Directory of Commodity Specifications*. By the time of the 1932 edition, more than six thousand standards and specifications had been classified. The *Directory* is periodically revised and enlarged, and supplements to the latest edition are published regularly. Today it is the prime source of information on the subject.

---

[2] E. H. Weaver, "Standardization — The Multiple Cost Reducer," *Purchasing*, Vol. 30 (June 1951), p. 95.

There is one potential difficulty in connection with establishing standardized commodities, and that is the tendency to rest on the oars after acceptance of trade standards. This tendency can delay, if not stifle, further improvements. Competition is probably our best guarantee against this easy attitude.

Controversial responsibilities

Whether the procurement department should have responsibility for such functions as inspection, stores, salvage and traffic is still a matter of controversy. Because these functions are closely related to the procurement process, the claims of procurement to organizational responsibility for them are not without merit. At the same time, there is always the suspicion that the procurement chief puts these claims forward largely to achieve membership in the group of top executives.

One authority suggests the desirability of combining inventory control, central stores, and certain phases of engineering with purchasing to form a new department referred to as "Materials Management." Usually such suggestions are based on overemphasis by marketing, formerly called the sales department. Marketing argues that since sales are the foundation for the budget, and determine the kinds and amounts of materials to be purchased, as well as the company's fiscal needs and the kinds and amounts of finished products to be made, a "Director of Marketing" is required to coordinate all these functions.

This approach, whether advanced by the sales or the procurement department, is an attempt to achieve coordination through empire-building. It has roots in a genuine problem — the conflict between specialization and coordination. The principle of specialization has been a crucial factor in the success of modern management. Specialization was demanded by the increasing division of labor. But there is a point beyond which the breakdown of functions slows the coordination of activities. When too many departments arise around specialized activities the normal span of control of top and middle management is violated. Hence, coordination becomes the crying need, and there is a swing back to the combining of departments and activities. This counter-tendency to overspecialization is the opening through which some enthusiasts in the procurement field are trying to crawl to expanded empires.

Although we are probably close to the necessity for some functional combinations, for the purpose of better coordination within the span of control, it will be unfortunate if any one of the major activities is given the whip hand to work out a solution. The over-all, objective approach must be used when planning an improved organization. Oversimplified suggestions for combining related functions can produce numerous conflicts on all layers of management. In any well-managed business, all the functions are interrelated. When this management axiom is recognized, any functionary can start a plan for better coordination by corralling "related functions."

In private institutions such a trend is often given the name of "serialization." Consider the reorganization proposals which the production chief can urge under the guise of "serialized production"! The sales chief can work out many personally advantageous schemes under the technical plan of serialized sales.

Procurement Organization

Organization is an important tool of general management, and the same is true on the departmental level. But it is a tool and not the job itself. Also, it is not an established pattern. For effective results it must be molded about a function or purpose, and to a limited extent about the personnel involved. Four phases of procurement merit discussion here. The first is decentralized purchasing, by departments. The second is concerned with the position of centralized procurement in the concern's general organizational hierarchy. The third phase applies to the internal structure of the procurement activity when it is set up on an independent functional basis, and finally, there is the problem of the large concern with centralized procurement and scattered plants or branches.

1. *Departmental Buying.* When the individual departments of a company buy the commodities they use, the plan is spoken of as decentralized, where procurement has no independent status in the general management hierarchy. Decentralized purchasing by using departments may well be referred to as "buying" because supporting research, standards and control are conspicuously absent. When any department assigns one of its staff to buying on a part- or full-time basis, control naturally rests with the department head, and buying may reach down to the foreman level. The advantages already given for centralized purchasing suggest the disadvantages of allowing departments to do their own buying. Department heads and foremen feel that they know more about all the commodities they use, and can buy more advantageously, than any purchasing agent. Fundamentally, they lack faith in the efficiency of specialized service or staff activities, unless it happens to be their own.

2. *The Position of Procurement in the Management Hierarchy.* Whether or not procurement is given one of the top-management positions depends largely on the importance of that function in the particular business. In some concerns, purchases loom large when compared to labor costs. In others, the opposite is true. Obviously, when purchases represent large volume and many varieties, procurement ranks high in the organization. In such cases, it may be headed by a vice-president. When the procurement dollar is not so important percentagewise, the department is likely to be in charge of a director who may report to the vice-president in charge of production, the treasurer or the plant manager. This is the customary plan in a medium-sized business where purchasing is centralized as a functional

department. When the department is relatively unimportant, the plant manager usually supervises it.[3]

Relations to the general hierarchy may be split, in a sense, when a company buys a large volume of special commodities, usually raw materials, as compared to their other purchases, which are considered incidental. For example, companies manufacturing cigars or cigarettes frequently buy their tobacco through a special committee of top management, or a member of top management who is a specialist in that field — often the president. The large volume of purchases in a particular commodity is only one of the reasons for committee or expert purchasing. These special commodities are often considered "price sensitive," and are usually quoted on commodity exchanges. As "sensitive" they may be subject to wide and rapid price fluctuations. Knowledge of market trends and seasonal factors are vital in this type of buying, and long experience is rightly considered as necessary for exercising good judgment in their purchase.

3. *Internal Organization of the Procurement Department.* Internally, buying in the procurement department is broken down into commodity classifications, based on the amount and variety of items used. Each classification is ordinarily assigned to a single buyer if its volume and variety is considered important.[4]

In addition, there are clerical personnel assigned to one or more activities such as requisitions, publication, invitations to bid, computation of bids, purchase orders and contract awards, surplus and obsolete materials, purchase records, expediting, invoice-checking, record-keeping and complaints.

All of the activities mentioned in connection with the internal organization of the procurement department are usually arranged in some hierarchial sequence which will aid effective management and coordination of the whole. At the top, there will be the manager, director or vice-president in

---

[3] Organizational information of this type may be found in the *Handbook of Purchasing Policies and Procedures* (New York: National Association of Purchasing Agents, Inc., 1939). For classifying companies according to size, the N.A.P.A. *Handbook* considers businesses small when their volume of purchase is under $1 million; medium when purchases are between $1 and $10 million; and large when purchases are over $10 million.

[4] One commodity classification list is divided into twenty accounts, covering general groups of purchases as follows:

1. Contractual services
2. Running contract services
3. Office supplies & equipment
4. Hospital supplies & equipment
5. Drugs and chemicals
6. Paints, supplies, oils
7. Cleaning supplies & equipment
8. Dry goods and clothing
9. Fuel and coal
10. Photo & engineering equipment
11. Petroleum products
12. Horticultural supplies
13. Hardware and cordage
14. Tools and appliances
15. Auto parts and supplies
16. Mechanical supplies
17. Electrical supplies
18. Building & road materials
19. Castings and forgings
20. Foodstuffs

charge of procurement. In a large organization, there are one or two assistants to the chief. They will be largely concerned with direct management of the department whose activities will be divided between them on some functional basis. Their purpose is to insure coordination within the organization, which is further secured by their reporting to the director. The individual buyers will be the first interest of one of these assistants, unless the buyers are divided into two general groups with an assistant in charge of each. Both assistants will often conduct minor negotiations within their buying ranges, with the advice of the director, and certify completed purchases to the treasurer for payment.

An office manager customarily has general supervision of all clerical help, in order to give maximum service to the buyers and those in charge of central stores and any other activities of the department. Such services include the clerical assistance in connection with requisitions, deliveries, routing of purchases, keeping vendor lists up to date, follow-ups where they are necessary, checking of receiving and inspection reports, records of items in storage, and the general inventory of commodities on hand.

4. *The Company with Scattered Branches.* A business with two or more scattered plants or branches may use either a centralized or decentralized organization plan for its procurement department, or a combination of the two. The natural tendency would be to centralize purchasing for all branches at the home office. However, individual plant or branch sizes and distances from the home office frequently require subordinate purchasing agents acting locally to look after some of the auxiliary functions of procurement. Another factor is the occasional necessity for emergency buying, which can be done better at the branch. When price and quality are equal, the local market should be used in order to maintain good public relations. Some publicity-minded businesses go even further in patronizing local markets.

When the central procurement department at the home office operates through its representatives in scattered branches, the question of their authority arises. If tight authority and control are retained in the central organization, the branch agent has no opportunity to exercise initiative. But initiative may be an important factor in training men for promotions. The ordinary solution is to delegate considerable authority for spot, emergency and local buying, with the home office exercising general control. Control may be maintained through policy manuals for general guidance, and by requiring branch reports in a form that can be checked against prescribed policies, instructions and operating standards.

Under branch operation with centralized control, the home office reserves buying responsibility for designated items. These are usually bought on long-term contracts, against which the branches may draw from vendors in accordance with their needs and against the original requisitions that they presented to the home office at the beginning of the buying year.

Home-office purchases will include items commonly used by most of the branches. Raw materials are frequently reserved for home-office purchasing. It is also customary for the branches to do their internal purchasing in accordance with a centralized plan. It is clear that in such cases home-office procurement is both centralized and decentralized in operations, but that its control over all procurement must of necessity be highly centralized.

The director

An auditor who had no respect for engineers because of the aura of mysticism they tend to set up about their profession, nor for salesmen, who he felt are too prone to misrepresent — if not actually lie about — their wares, combined these feelings when he described the purchasing agent as one who starts out by knowing everything about everything, but ends by knowing nothing about anything because of his associations with engineers and salesmen. This rather general attitude toward the director of centralized purchasing exists with many department heads to a greater or lesser degree. It is necessary, therefore, for the procurement director and his buyers to know the technical phases of their business, especially if they hope to gain and hold the respect of the departments which they serve. Not only must the director have at least a speaking knowledge of the many commodities he is responsible for purchasing, but he must also be diplomatic in convincing his peers of that fact. The best way to obtain a cooperative attitude on the part of those for whom he buys is through adequate service combined with the ability to show others that he appreciates their points of view and the experience and training on which they are based.

His own need for training and experience is emphasized by some of the unfair pressure he must frequently combat with competitive vendors who are alert to every device in pushing their wares. One of the common practices of sellers is the attempt to influence buyers, and even the procurement director, to look favorably on their commodities by quoting some foreman as hoping that procurement will buy the vendor's merchandise by brand name when it receives the next requisition. This idea of trying to use foreman influence with procurement is always resented. It is the basis for the general prohibition against sellers' dealing directly with foremen without prior permission from purchasing. An experienced purchasing director will call the seller's attention to his company's rule while assuring him that the positive side of that policy is also in effect. In other words, the director will gladly call in a representative of any using department if the vendor requests it and if the director feels that a three-way discussion of the subject will be helpful.

Against such a background, the purchasing agents of many medium-sized and small businesses must not only know their field, but they must combine diplomacy with a large sense of humor. Of course, the large departments, headed by vice-presidents, have their peers on the top level of management, and are correspondingly accepted with good grace by the lower echelons of department managers. But this struggle of the average purchasing agent for recognition is more or less expected because of the newness of his management field. One need only explore purchasing history of the past twenty-five or thirty years to find centralized purchasing looked on as a necessary evil. Procurement agencies in private business are now better armed to prove their usefulness. The difference in the dollar cost of procurement in proportion to volume of purchases, and the percentage of savings on the same volume, shows a healthy profit even when viewed most conservatively. This situation is generally admitted even though it is sometimes difficult to figure exact before-and-after differences.

In the field of public institutional purchasing, the director has some additional types of vexatious dealings. As taxpayers, most citizens are interested in seeing that purchasing gets the greatest possible value from their tax dollars. At the same time, some of the taxpayers are also potential suppliers, which makes them feel that they have a democratic right to have a reasonable amount of tax dollars flow through their private businesses. It is this situation which makes it advisable to do most public purchasing through sealed bids rather than by negotiation, especially when the amounts involved are considerable. The purchaser for public institutions feels that he must be prepared at all times to have his records investigated by city council, county commissioners or the state legislature, in order to satisfy the public criticisms of any tax-paying vendor.

There is also the question of control for both private and public centralized purchasing departments. Most capable buyers prefer a free rein in managing their departments. However, it is easily understood that small departments, or a single buyer with a secretary, will necessarily be overshadowed by superior authority in the organization, and hence expect more or less minute instructions and relatively close control. In many cases, this situation assures protection for the new purchasing agent against what he considers his common enemy of department heads. His vulnerability is thereby lessened while he is proving his worth.

Supervision and control, in both private and public buying, are frequently exercised by a committee. In private business, the committee members are usually selected because of their knowledge and experience in a particular field. Committee purchasing is not at all unusual in business when expensive machinery is being bought, or obsolete equipment is being sold in the name of procurement. In public purchasing, the committee members may be selected for reasons other than their purchasing ability. For general purchasing, the public committee sometimes subordinates the application of accepted principles to political logrolling. When procurement receives a requisition to buy paper "as per sample attached," it cannot apply purchasing principles. And obviously it lacks the confidence of the personnel controlling its activities.

Training and experience are assumed prerequisites for the procurement director. But because of departmental and foreman skepticism of centralized purchasing, its director has many problems in human relations. Patience is a tool he must learn to use with skill. He should always try to make it clear to others in the organization that his function is service; that to render it effectively, the cooperation of the men on the line is absolutely necessary; and that he is not only willing but eager to have their advice and assistance. He will accumulate confidence as he is able, from time to time, to take items of personal interest to those whom he serves. When mutual confidence is established between the director and those for whom he buys, the resulting two-way flow of information will be of value to both sides, as well as to their employer.

Physical Layout

Office layout is important for obtaining an expeditious flow of work. For the purpose of making an acceptable layout, or revising a poor one, the process chart is the best tool. It not only indicates in visible form the proper sequence of activities, as well as the desks, file cabinets, and other arrangements for insuring flow of work, but it also records distances traveled by papers and clerks. Critical study of such a picture points out operations which can be combined, eliminated or have their sequences changed. Physical locations of office equipment can be further visualized by the use of templates, made to scale. They can be arranged and rearranged until a model floor plan is obtained. The best plan requires the template layout to conform to the layout on the process chart. The two methods are simply different ideas for accomplishing the same purpose. Figure 29.1 illustrates the flow of work through the procurement department. These activities may be carried on in a single large room, or in a series of rooms. The plan is purely functional. The activities shown on the right-hand side of Figure 29.1 are those which have not yet gained general acceptance as procurement responsibilities.

When allied activities such as receiving, inspection, stores and inventory control are under the supervision of procurement, they must be considered in the general plan. They should present a proper flow of work within each unit, as well as a coordinated flow with the central office of procurement.

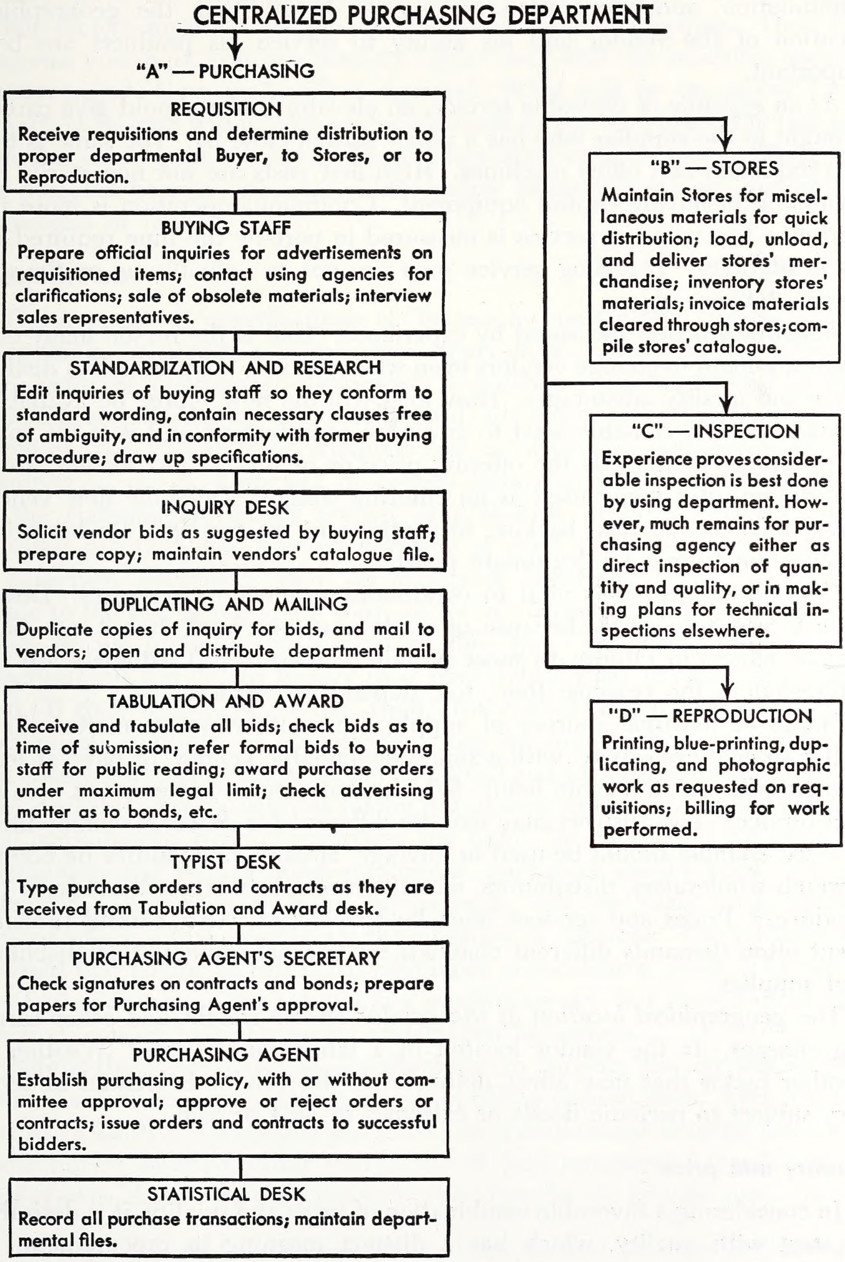
Policy Decisions

Definitely established policies, in writing, must precede operations if the latter are to be coordinated. Policies are the guiding hand of coordinated management; they establish the working boundaries of supervision, and they prescribe the limitations of management control.

The chief considerations for determination of procurement policy are: (a) source of supply, (b) quality, quantity and price, (c) specifications, (d) reciprocal buying, (e) collusion, (f) forward and speculative buying and (g) personal purchases.

FIGURE 29.1

Flow of Work for Procurement



CENTRALIZED PURCHASING DEPARTMENT

"A" — PURCHASING

REQUISITION

Receive requisitions and determine distribution to proper departmental Buyer, to Stores, or to Reproduction.

BUYING STAFF

Prepare official inquiries for advertisements on requisitioned items; contact using agencies for clarifications; sale of obsolete materials; interview sales representatives.

STANDARDIZATION AND RESEARCH

Edit inquiries of buying staff so they conform to standard wording, contain necessary clauses free of ambiguity, and in conformity with former buying procedure; draw up specifications.

INQUIRY DESK

Solicit vendor bids as suggested by buying staff; prepare copy; maintain vendors' catalogue file.

DUPLICATING AND MAILING

Duplicate copies of inquiry for bids, and mail to vendors; open and distribute department mail.

TABULATION AND AWARD

Receive and tabulate all bids; check bids as to time of submission; refer formal bids to buying staff for public reading; award purchase orders under maximum legal limit; check advertising matter as to bonds, etc.

TYPIST DESK

Type purchase orders and contracts as they are received from Tabulation and Award desk.

PURCHASING AGENT'S SECRETARY

Check signatures on contracts and bonds; prepare papers for Purchasing Agent's approval.

PURCHASING AGENT

Establish purchasing policy, with or without committee approval; approve or reject orders or contracts; issue orders and contracts to successful bidders.

STATISTICAL DESK

Record all purchase transactions; maintain departmental files.

"B" — STORES

Maintain Stores for miscellaneous materials for quick distribution; load, unload, and deliver stores' merchandise; inventory stores' materials; invoice materials cleared through stores; compile stores' catalogue.

"C" — INSPECTION

Experience proves considerable inspection is best done by using department. However, much remains for purchasing agency either as direct inspection of quantity and quality, or in making plans for technical inspections elsewhere.

"D" — REPRODUCTION

Printing, blue-printing, duplicating, and photographic work as requested on requisitions; billing for work performed.

Source of supply

In fixing a policy for the source of supply, management must consider such intangibles as reliability, continuous supply, favorable price and quality combination, and cooperation or service. In addition, the geographical location of the vendor and his ability to service his products are both important.

As an example of desirable *service*, an elevator buyer should give careful thought to the supplier who has a repair station close by. The same is true of production and office machines. High first costs are not necessarily determining in buying capital equipment. Continuous operation is more important. The value of service is measured in part by the time required for its availability. Traveling service men are not so valuable as on-the-spot repair stations.

Reliability is best measured by experience. That is the reason many concerns are loath to change vendors even when the new supplier offers distinct price and quality advantages. How long will the new source be available? Confidence is a valuable asset to any sales organization, and it is the spark of profitable trading. Is the offering price or quality a "loss leader," to be withdrawn after being used as an entering wedge? Does the new vendor have sufficient financial backing to continue in the market? Do his prices enable him to make a legitimate profit?

Continuous supply is vital to continuous production processes. Downtime is not only costly because of continuing overhead, but it can have serious effects in failures to meet promised deliveries. Customers are not interested in the reasons; they, too, depend on service.

Single or *multiple* sources of supply are another policy matter. Is it better to deal exclusively with a single dependable vendor, or have at least two suppliers in the same field? Which plan assures better price, quality and service? The answers may well be different for different commodities.

What *channel* should be used in buying? Should commodities be bought through wholesalers, distributors, manufacturers' agents, or direct from the producer? Prices and services must be considered. Also, careful procurement often demands different channels for various commodities, machines and supplies.

The *geographical location of the vendor* affects freight and other carrying charges. Is the vendor located in a labor-trouble area? Weather is another factor that may affect deliveries if the vendor is located in territory subject to periodic floods or extremes of heat or cold.

Quality and price

In considering a favorable combination of price and quality, it is desirable to start with quality, which has a distinct meaning in procurement. It signifies the *right quality for the purpose intended.* Quality higher than that required for the job is poor procurement. It runs up costs, and may price its user out of the market. Quality inferior to that required will add to profits only momentarily because it will lose customers. It is only after quality is definitely and scientifically determined that price can be considered.

With quality decided on, and with reliability and other factors satisfactory, price may be determining, especially with respect to raw materials. Other factors must be weighed if the purchase is a machine. Then the long-run cost is of primary interest. How long will the machine operate satisfactorily? How well will it operate? What will be its second-hand value? How long will it take for the machine to pay for itself? On this last question, many concerns have a fixed policy, such as three years. When will the machine become obsolete? These policy considerations are part of the economics of buying.

Specifications

The purpose of specifications is "to secure constructive application of scientific knowledge to service requirements; to coordinate similar demands and eliminate unessential differences; to balance increases in cost against probable service improvements, taking full advantage of existing commercial varieties; and to formulate adequate test or inspection methods — all this resulting in the development of greatly improved products, vital support to the National movement toward simplification of lines, processes, and business practices, and marked lowering of costs and prices."[5]

Tolerance allowances have an important effect on profits. They may apply to the size of parts, the warp-and-woof thread count, tensile strength, color, or any other quality for which the "specs" require a standard. If specifications are drawn loosely they may defeat their purpose in production. If their tolerances are too "tight," the cost of production is increased, and rejects multiply. A specification may be unnecessarily exacting. As we pointed out in Chapter 18 on Quality Control, engineers like to play safe, and they have a habit of taking unforeseen contingencies into account and consequently making tolerances too tight. To do a good job from the production and management standpoint, engineers should know the use intended. Tolerances on bolts, for example, may be fairly loose without serious effect. On a microscope the situation is different. The military has learned that engineers can make tolerances unnecessarily close. The resulting higher costs may not be vital in a war emergency, but slowed-down production, caused by unnecessary rejects, can be serious.

Before the general use of specifications in buying, the customary procedure was to request a particular brand of the desired item. This practice led to all kinds of favoritism and graft. As specifications became prevalent, loose buyers satisfied public indignation if they represented a public institution — or their own conscience, if they bought for private use — by requiring the brand article "or its equivalent," thus retarding the development of real specifications. Another step in less scientific purchasing is the "limited specification" which restricts competition to two or three bidders, or possibly only one. In New York City, for example, some years ago fire-engine specifications restricted the bidding to La France equipment. It is poor practice to draw specifications without consulting the "trade," but it is worse to allow the favored supplier to write them.

---

[5] From the Foreword to the first edition of the *National Directory of Commodity Specifications* (U. S. Department of Commerce, Bureau of Standards, Miscellaneous Publications No. 65, 1925).

Although normal trade practice should prevail, occasionally a vendor is asked to bid on absurd specifications. The classic example is for "steer hides" for certain kinds of leather goods, in spite of the fact that it is impossible to determine the sex of the animal from its hide.

Good specifications reduce disputes between buyer and seller, where mutual confidence generates mutual benefits. Clear and honest specifications, free from limited-supplier or trade-mark clauses, promote competition. Anything which limits the number of competitive bidders, works to the disadvantage of the buyer in both price and quality. Good specifications are also an aid to good inspection.

Reciprocal buying

Reciprocal buying is illustrated by the well-known phrase "you scratch my back and I'll scratch yours." It refers to an agreement by two or more concerns to buy one another's products. It is generally frowned on by purchasing associations. In most cases, reciprocal-buying instructions come to procurement from "above." In spite of the dubious nature of this business practice, it must not be assumed that it is illegitimate. Some reputable companies have a committee to consider when and where reciprocal buying is beneficial.

The chief advantage of reciprocal buying inures to the concern's sales department. From the buying standpoint, it tends to restrict the sources of supply. When reciprocal buying is practiced between two or more corporations, all of which are controlled by a parent company, the advantage–disadvantage score is probably a tie. The net advantage or disadvantage depends on the circumstances, each of which must be judged on its merits.

Collusion

Collusion among sellers can reduce honest buying to a hopeless task. In the electrical industry, in certain chemical compounds and in fire hose, illicit combinations were proverbial in the past. For several years, six or seven chemical companies combined on the classical price of $1.00 for serum antitoxin. Insulin paid tribute to a Canadian manufacturer until four American suppliers were forced from their collusive price of "what the traffic will bear," and this drug relief for diabetics joined the competitive market. From time to time collusive soap prices have been flagrant. Soda ash is another favorite on which producers have ganged up on buyers.[6]

There are two plans for combating collusion rackets. One is to report them to the Federal Trade Commission, and the other is to mobilize trade associations and state leagues of municipalities in a united frontal attack.

Forward buying

Forward buying may be focused on protecting the company's supply, or it may be speculative. The former is looked on as good practice if it is based on factual information. Speculative buying, however, is generally condemned in those cases where normal profits can be made by following the market, and large losses may result from wrong prognostications of future prices.

Writers on the subject of speculative buying usually condemn the practice for all producers. However, experience demonstrates that it may represent good business sense when restricted to sensitive-priced raw materials used in the productive processes. General price fluctuations are less pronounced with finished products than with sensitive raw materials. Under such conditions, and assuming that speculation in raw materials has resulted in an oversupply for production purposes, the speculating concern can sell its surplus for a profit if the market rises, and protect itself against heavy loss on a declining raw-material market by processing it into the finished product.

Personal purchases

Finally, the practice of buying commodities for employees in order that they may secure more favorable prices requires a policy decision. We have already discussed the conditions under which personal purchases are ill advised in the chapter on Personnel Relations.[7] Some businesses view this practice as a commendable service which tends to improve worker morale. Others consider it a management headache which produces more bad than good feeling. Not only do personal purchases take up buyer and clerical time, but complicated problems of exchange and credit privileges are also likely to be involved. In general, this practice is declining.

Forms and Procedures

Forms are a reflection of procedures, for which they are a running record. The number of forms, and the details they carry, depend on the size of the organization, the number and amount of its purchases, and the reports required by top management. Whether procurement is operating for a public or private institution is another consideration. Public institutions do a large percentage of their buying volume by sealed bidding, which uses special forms for legal advertisements, bid and completion bonds, and bid lists.

---

[6] "Payoffs" by suppliers have often been exposed. See, for example, A. N. Wecksler, "Contacts for Contracts," *Purchasing*, Vol. 34 (March 1953), pp. 85–86; and the report on hearings before the U. S. House Committee on Armed Services concerning the investigation of the B–36 bomber program in 1949 (Eighty-first Congress, First Session). Some years ago, the *Atlantic Monthly* (Vol. 176, January-March 1935) published three excellent articles on the subject entitled "The $10,000 Gallon of Oil," "The $3000 Snow Shovel," and "Thirty-Eight Gondolas of Granite."

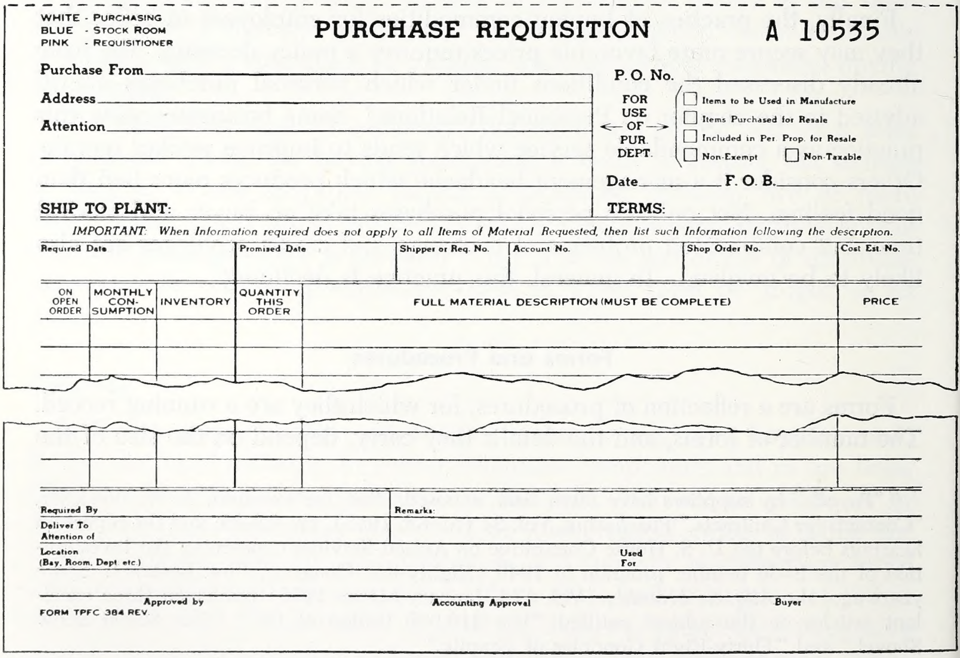
[7] See page 421.

The following list of forms for both private and public purchasing, though not complete, is suggestive:

1. *Requisition* form from the using department, which may be "regular," "emergency," "stores," or "interdepartmental." (See Figure 29.2.)
2. *Invitation-to-bid* form, which may be used for either negotiated buying or for sealed quotations. This category includes forms for legal advertisements and computation of bids. In either public or private procurement, bid and completion bonds, as well as correction and cancellation forms may be used.
3. *Contract-award* or *purchase-order* forms are fundamental in purchasing.
4. *Record of test-analysis,* and all other types of inspection forms are important checks prior to payment of invoices.
5. *Claim vouchers* are sometimes presented by the purchaser to the vendor.
6. *Coordinated purchasing* forms are used by businesses having branches. They are also used by public institutions which pool their requirements.

FIGURE 29.2

Purchase Requisition



WHITE - PURCHASING
BLUE - STOCK ROOM
PINK - REQUISITIONER

PURCHASE REQUISITION A 10535

Purchase From
Address
Attention

SHIP TO PLANT:

P. O. No.

FOR USE OF PUR. DEPT.
☐ Items to be Used in Manufacture
☐ Items Purchased for Resale
☐ Included in Per. Prop. for Resale
☐ Non-Exempt ☐ Non-Taxable

Date F. O. B.

TERMS:

IMPORTANT: When Information required does not apply to all Items of Material Requested, then list such Information following the description.

Required Date	Promised Date	Shipper or Req. No.	Account No.	Shop Order No.	Cost Est. No.

ON OPEN ORDER	MONTHLY CON-SUMPTION	INVENTORY	QUANTITY THIS ORDER	FULL MATERIAL DESCRIPTION (MUST BE COMPLETE)	PRICE

Required By
Deliver To Attention of
Remarks:
Location (Bay, Room, Dept. etc.)
Used For

Approved by
Accounting Approval
Buyer

FORM TPFC 384 REV.

Courtesy: Thompson Products, Inc.

7. *Surplus* or *obsolete* items are reported on special forms, with space for before-and-after disposition records.
8. Records are customarily kept for *stores, purchases, vendors, commodities,* and *prices.*
9. *Expediting* procedure usually rates a form, which is naturally more detailed in institutional procurement.

Large buyers of numerous commodities sometimes compile a *commodity index* for each major commodity, to show price trends over a number of years as an aid to forward buying. A *composite commodity index* establishes a similar trend for a large group of items in which procurement is interested.

Measuring Department Operations

The effectiveness of department operations can be measured by statistical comparisons for various periods, or with established standards, by reports analysis, or by periodic surveys and appraisals. Any of these methods may be used by those inside the organization or by some outside agency, which is more likely to do an objective job. Operating standards are always more or less speculative and certainly not fixed over any considerable period. Most of them are the results of averages, rather than scientific determinations, and are derived from trade associations which have access to member reports.

Organization and duties should have first consideration in an over-all survey. The former would include the accepted techniques for good management, and the latter should cover those things necessary to accomplish company procurement objectives. As with all surveys, the facts may be gathered from operating personnel, including the director, and then checked against actual operations.

A list of subjects for consideration should include:

Organization
Duties and policies
Quality of personnel
Aids to top management
Department morale
Intraplant relations
Supplier relations
Community relations
Control devices
Reports and records
Dollar volume of purchases
Number of transactions
Forward buying records
Speculative gains and losses
Inventories and prices
Backlog of requisitions
Rush and overdue orders
Surplus and obsolete records

The purpose of measurement of all management activities is to check against existing methods, and plan improvements. Departmental resistance to this procedure is a sign of internal laziness, or spectacular lack of appreciation for the fundamentals of scientific management. When the department members understand the principles of management, surveys are welcomed.[8]

---

[8] *Cutting Costs by Analyzing Values* (New York: National Association of Purchasing Agents, Inc., 1952) presents a "practical purchasing program."

Conclusions

Procurement has just about emerged from its swaddling clothes to join the well-established group of management controls. For too many years it was considered an activity which any one with common sense could handle — preferably the person using the commodities to be bought. Enlightened procurement personnel get the credit for developing the possibilities in this field. The application of scientific principles has now reached a point where top management can be shown real values in dollars and smooth operations resulting from a well-planned and well-managed procurement program.

QUESTIONS

1. What is meant by serialized purchasing, and what is its relation to procurement?
2. What are the outstanding disadvantages of decentralized purchasing, and what are the chief arguments of its proponents?
3. How does centralized purchasing reduce overhead costs?
4. What maximum limit would you favor for negotiated buying for public institutions? Why?
5. What are the chief reasons for sealed bids in formal or institutional buying? To what extent do you think these reasons are valid?
6. What limitations would you place on the "controversial responsibilities" of the procurement department?
7. How do determination of the sources of supply, and selection of the supplier, rank among the problems of the purchasing agent? What are the reasons for your opinion?
8. Assuming that mutual advantages for the purchasing agent and the vendor result from visits of the former to the latter's plant, what are they?
9. How can the director of procurement contribute to management decisions concerning the buying or making of required components, and the purchase of capital equipment?
10. Should inventory control be a responsibility of procurement? Give your reasons for and against.
11. How do specifications aid in inspection?
12. What do you think of procurement's claim to the establishment of a "materials-management" department? Give the reasons for your answer.
13. What factors should be considered in placing procurement or purchasing in the company's organization structure?
14. Set up the internal organization of the procurement department for some specific company.
15. How would you plan the layout of a serialized purchasing department?
16. What subjects should be considered in the policy manual for procurement?
17. How can procurement serve company interests by its critical analysis of the tolerances requested by the using departments? Do you feel that procurement is justified in sharing responsibility for determining tolerances?

18. Are you in favor of reciprocal buying? Give its advantages and disadvantages, and the procedures which should be observed when it is practiced.
19. What are the principal forms used by procurement, and what are their purposes?

CASE PROBLEM

FULFORD DEPARTMENT STORES, INC.

Fulford Department Stores, Inc., mailed requests to bid on a list of bedding supplies for its twenty furniture departments to fifteen manufacturers in its territory. The announcement stated that the bidding would be on a formal basis, that all bids must be sealed, and that they would be opened in the presence of the bidders on a specified date and time. The request further stated that price, specifications quality, and opportunity for vendor service would all be considered in placing the contract, which would amount to more than $100,000. It further requested that samples be submitted of materials to be used by the vendors, for testing and inspection purposes, and that each bid should be accompanied by a certified check for $5000 to insure compliance in event of award — checks to be returned to unsuccessful bidders.

The items on the bid list included several grades of mattresses, with detailed specifications for each grade. Other items were pillows, woven wire springs and studio couches, each with detailed specifications as to raw materials to be used, their patterns, strength, weight, etc. Packaging specifications were given, and return of empties promised at the vendor's expense, when requested. Delivery by vendor's truck eliminated packaging requirements. All bids were requested f.o.b. Fulford's stores, a list of which were enclosed with the announcement, as well as the quantities to each store.

The announcement stated that *separate bids were required on all four items.* Payment was promised the successful bidder within thirty days after receipt and acceptance of the merchandise. Fulford reserved the right to reject any and all bids.

Five bids were opened and tabulated as follows:

Bidder	*Mattresses*	*Pillows*	*Springs*	*Couches*
#1	$75,800	$8,320	$12,750	$22,000
#2	81,635	7,500	13,225	20,800
Alternate Specifications	70,500			17,225
#3	"All or none, on the specifications" Lump-sum bid on all the items $120,000			
#4	75,800	8,320	12,750	22,000
#5	(No bid)	6,275	(No bid)	18,800

PROBLEM. If you were the Director of Procurement for Fulford Department Stores, to whom would you award the contract?

CHAPTER 30 *Marketing*

David Harum, the horse trader, made some interesting sales, but he could scarcely be accused of "marketing" his product. Just as a great many activities have clustered around the nucleus of buying to form the new scientific procedures of procurement, so too have the many activities related to selling been brought together by modern management to form the broader department known as *marketing.* Marketing, as distinct from a simple sales department, begins when the producer no longer has the time to devote a major part of his attention to finding buyers for his products. It has been defined as "all business activities necessary to effect transfers in the ownership of goods, and to provide for their physical distribution." [1]

The scope of the sales or marketing department varies from company to company. Where a full-fledged marketing department exists, it usually includes the following activities:

1. Advertising and sales promotion [2]
2. The selection of distribution channels
3. Product and marketing research
4. Costs of producing and selling
5. Transfer of title to goods
6. Miscellaneous services to customers
7. Training and supervision of sales personnel

---

[1] Harold H. Maynard and Theodore N. Beckman, *Principles of Marketing* (5th ed.; New York: The Ronald Press Company, 1952), p. 3. The American Society of Mechanical Engineers includes marketing within the broader function of *distribution,* which it defines as "the total of all activities involved in the progression of goods from the producer to the consumer, including warehousing, transportation, wholesale and retail marketing, advertising and a substantial part of research, engineering, accounting and financing."

[2] With the development of promotional schemes for selling, the difference between advertising and promotion has become more pronounced. Today, the two activities are customarily assigned to different groups, on the assumption that the two skills require unlike approaches. Advertising is a well-understood concept which uses many vehicles, such as posters, newspapers, radio and television. Examples of sales promotion are the 1¢ sale, give-aways for writing about the superiority of a product "in fifty words or less" and similar schemes.

In many concerns, warehousing is also under the control of the marketing department.

Irrespective of the various activities included, marketing has secured a firm position in the top chain of command. Whereas purchasing — or even procurement — sometimes reports to the production department, sales or marketing has long been considered of equal rank with production and finance.

The Cost of Distribution

We have already suggested that marketing steps in to aid the producer who no longer has the time — or sometimes even the know-how — for selling his product. Our specialized type of marketing must have been successful in maintaining and increasing sales, otherwise it would not have survived. By expanding markets, it has increased demands on production. Volume production leads to cost economies and lower prices which make possible larger sales to more people. This spiraling process has had a distinctly beneficial effect on our standard of living. Everyone admits it, including sales organizations, which accept credit for starting the process.

There has, however, been a widespread condemnation of the excessive costs of distribution, which includes such items as packaging, servicing, warehousing and transportation, in addition to selling. Admitting that positive economic and social values result from "stimulation of demand," consumer and economic research groups have been asking for years whether all the costs incurred are necessary. Recent studies have pointed out that it takes two men to sell and distribute one man's production. A committee of the Twentieth Century Fund estimated that in 1929, only about 41¢ of the consumer's dollar represented production costs and the remaining 59¢ went to pay for distribution. They found that since that time the costs of distribution have become even greater.[3]

The Distribution Committee of the American Society of Mechanical Engineers has made a study of the same subject since that time, but it did not arrive at any conclusion about what portion of the consumer's dollar was spent for distribution. It did, however, conclude that there have been a number of management economies effected in some sections of this field since 1929, but they have, in large part, been offset by increased expenditures for other phases of the distribution function.[4]

Marketing costs are a concern of the producer as well as the consumer, since they often form a major part of his total costs, thus influencing the price of his product. In the past, when management has tried to reduce costs, it has looked first to the possibilities of economizing in the production process. But with the steady increase in the cost of labor and raw materials since World War II, it is not surprising that more attention is being given to the long-neglected area of cutting selling and distributing costs. While production savings are, for the most part, under direct supervision of the manufacturer, such marketing factors as advertising and transportation are usually hired services, and hence more difficult to control. However, pressure from consumer groups is leading to searching analysis of distribution costs. Management's new engineering approach in this field should gradually lead to lower costs.

---

[3] *Does Distribution Cost Too Much?* (New York: The Twentieth Century Fund, 1939), pp. 116–118.

[4] Published under the chairmanship of Stokes Tomlin, in the *Transactions* of the ASME in May 1953.

On the other hand, there is a school of thought, originating chiefly in the advertising agencies, which holds that distribution costs, far from being too high, might well be increased in the public interest. This claim is supported by the following argument. As distribution increases, the volume of production must increase to satisfy the ever growing demand for the product. As volume of production increases, unit cost per item is correspondingly lowered. Thus, the argument concludes, the more money spent on increasing demand and facilitating distribution, the less the ultimate cost of the item.

A specific example will illustrate this reasoning.[5] Suppose that in 1870 it cost $250 to distribute a consumer item which cost $750 to produce. This would make the total cost of the item $1000. Now let us suppose that the same item can be produced today for $250 — because of large-scale production made possible by large-scale sales. If we assume further that distribution costs have remained constant at $250, then the total cost of the item has been reduced to $500. Thus, even though distribution makes up a larger proportion of the total cost today — 50 per cent, as against 25 per cent in 1870 — the increased distribution costs have had the effect of cutting the total cost in half.

There is some validity in this reasoning, but it is an overstatement of the case for distribution. Even if we accept the assumption that the demand for greater volume of production would not exist without the increased expenditures for promotion and distribution, it would nevertheless be true that the rate of savings effected by increasing volume of production must eventually shrink to insignificance, for every manufacturing enterprise has a base of fixed costs which are practically irreducible. If, at the same time, the cost of distribution continues to rise, a point will eventually be reached at which the unit cost of the item will begin to increase. Clearly, then, management cannot accept this argument at face value. It must have ways of finding out, first, whether an increased expenditure on distribution will bring about increased demand for the item and, secondly, whether the resulting increased volume of production will bring about a commensurate decrease in the unit cost.

---

[5] Taken from *Does Distribution Cost Too Much? — It May Cost More,* a brochure published by the J. Walter Thompson advertising agency, at the request of the American Marketing Association.

Let us admit that modern distribution techniques have contributed to the reduction of unit costs. The question still remains: why should not the application of scientific principles to large-scale marketing bring about reductions in the unit costs of distributing, just as they have for production? Final decisions about distribution costs should not be based on the social and economic benefits which have resulted from modern marketing techniques, or on what the traffic will bear, or on the plea that these techniques have made a lot of jobs for a lot of people. The real question is whether or not the current methods can be improved.

Establishment of more and better standards in the various phases of marketing is the basic need. Proposals for points of attack come from both inside and outside the field. They include such suggestions as:

1. Improved planning based on better cost accounting
2. Application of engineering methods to market analysis
3. Selection of accounts, territories and products
4. Simplification and standardization of styles and sizes
5. Better methods of handling, shipping and warehousing
6. More realistic advertising and sales promotion
7. Reappraisal of product design and expensive packaging
8. Reduction of unnecessary and unwanted services
9. Improved selection and training of sales personnel
10. Better departmental organization

In the final analysis, the buying public represents the chief pressure group for bringing about improved methods of distribution. Pressure will be effective only when consumers are educated to the realities of this overorganized field. The distribution agencies cannot be counted on to supply the leadership for training consumers in the art and science of buying; it must come from the consumers' organized groups.

Organization

The organizational structure of the sales or marketing department depends on a number of factors, the two most important of which are volume of sales and the nature of the product or products. Whether the department is confined to selling, or embraces all the related activities which go to make up the broader function of "marketing," it is almost invariably on a high executive level, reporting to the president or executive vice-president.

The general organization is determined by one of three basic considerations: *product, territory* or *function.* If the company sells a substantial quantity of a variety of products, then the organization is customarily broken down on a product basis. For example, an electrical equipment concern may make a full line of household appliances, pumps for the industrial trade, and motors for machine-tool builders. Obviously, each of the three lines has a distinctly different customer appeal, and may be sold through several different channels. In addition, these products are so different in operation and are put to such different uses, that it would be difficult to train a group of salesmen as successful demonstrators of all three types of merchandise — not to mention the three different methods of customer approach necessary to do a good selling job. Figure 30.1 illustrates the product type of sales organization.

A well-known example of organization on a product basis is General Motors, which sells several trade-named passenger cars and trucks. Even within the passenger-car field, its sales organization is definitely split ac-

FIGURE 30.1

Sales Organization by Product on Territorial Basis

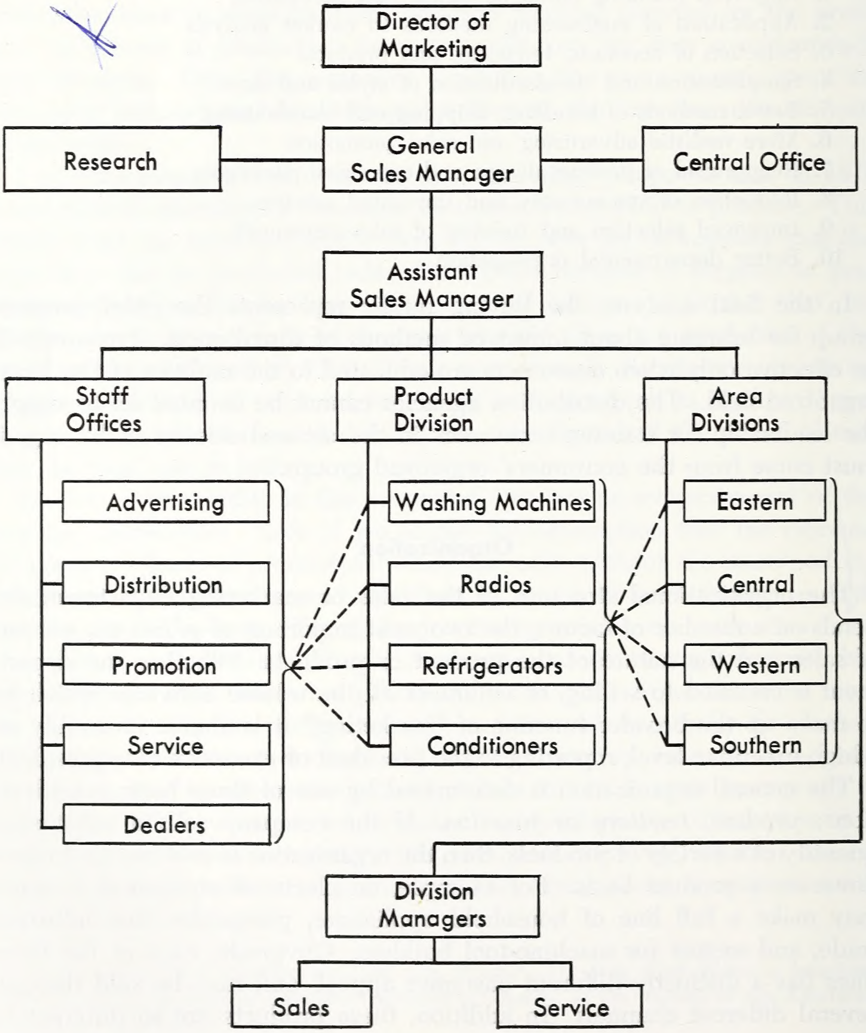
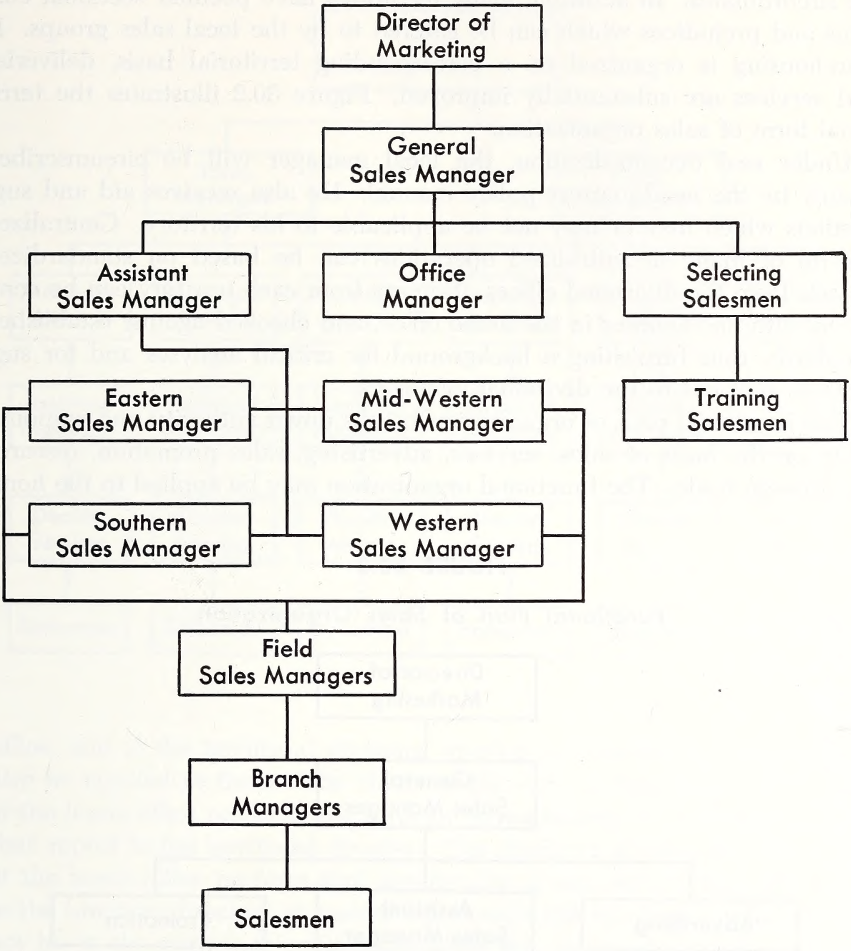

Director of Marketing
Research
General Sales Manager
Central Office
Assistant Sales Manager
Staff Offices
Product Division
Area Divisions
Advertising
Distribution
Promotion
Service
Dealers
Washing Machines
Radios
Refrigerators
Conditioners
Eastern
Central
Western
Southern
Division Managers
Sales
Service

FIGURE 30.2

Territorial Sales Organization


Director of Marketing
General Sales Manager
Assistant Sales Manager
Office Manager
Selecting Salesmen
Eastern Sales Manager
Mid-Western Sales Manager
Training Salesmen
Southern Sales Manager
Western Sales Manager
Field Sales Managers
Branch Managers
Salesmen

cording to the name of the car, and competition among the various makes of this single commodity line is maintained at a high level.

The product basis of organization permits distinct sales approaches to different groups of customers. In addition, it makes possible pre-sale demonstrations and post-sale services of a rather special nature. With some products neither demonstration nor service is necessary. In other cases, post-sale services have become so highly specialized that they invite criticism because of the unnecessary costs they contribute to the selling price.

The *territorial* plan for organization of sales is used to promote decentralized supervision and centralized control. This type places divisional managers in charge of assigned territories. The extent of their authority depends on the degree of centralization desired. In any case, a territorial organization makes for initiative on the part of the divisional manager and his subordinates. In addition, many territories have peculiar sectional customs and prejudices which can be catered to by the local sales groups. If warehousing is organized on a corresponding territorial basis, deliveries and services are substantially improved. Figure 30.2 illustrates the territorial form of sales organization.

Under real decentralization, the local manager will be circumscribed mainly by the headquarters policy manual. He also receives aid and suggestions which may or may not be applicable to his territory. Centralized control of many decentralized operations can be based on standardized reports from the divisional offices. Reports from each territory can be compared with one another in the home office, and checked against established standards, thus furnishing a background for critical analyses and for suggestions sent out to the divisional managers.

The *functional* plan of organization breaks down authority and responsibility on the basis of sales, services, advertising, sales promotion, research and foreign trade. The functional organization may be applied to the home

FIGURE 30.3

Functional Plan of Sales Organization

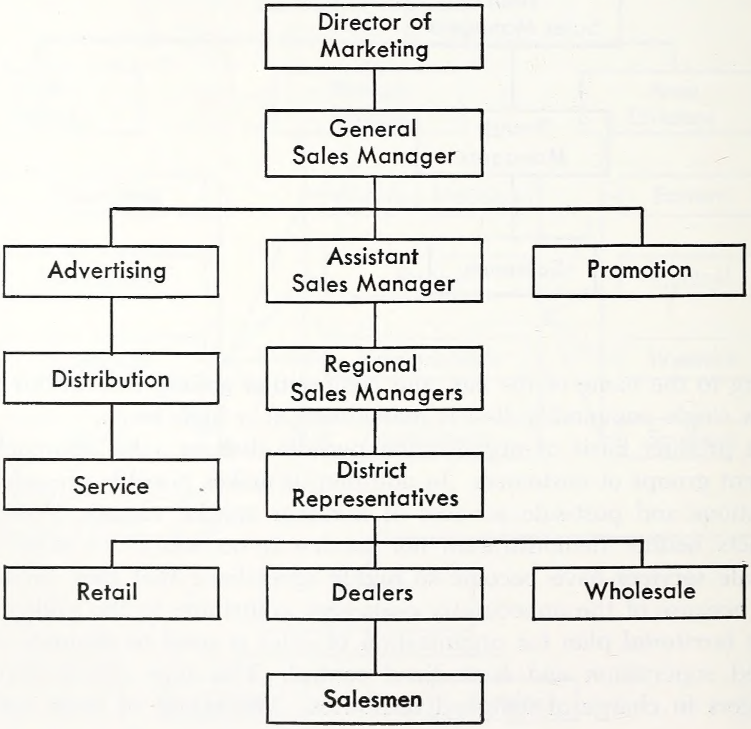
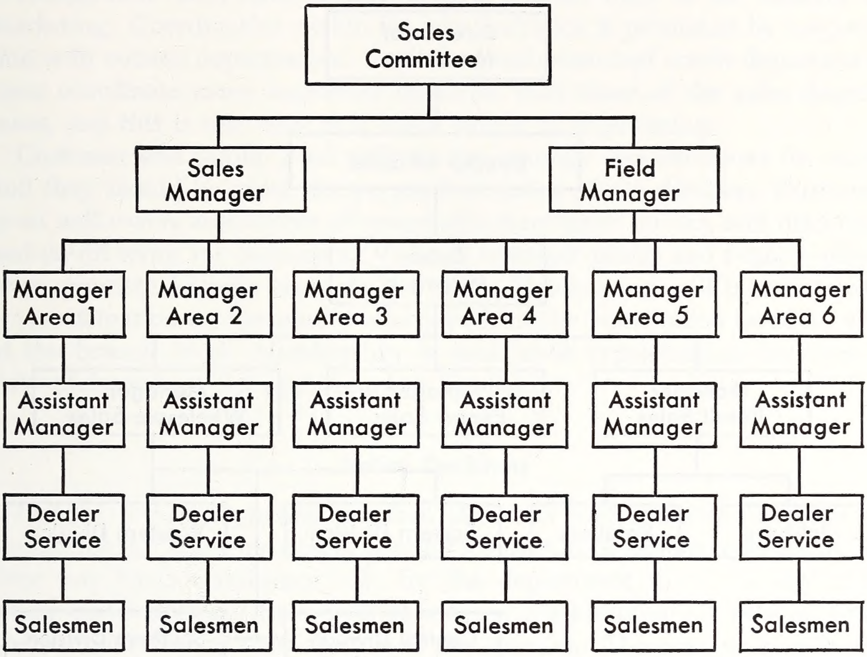

Director of Marketing
General Sales Manager
Advertising
Assistant Sales Manager
Promotion
Distribution
Regional Sales Managers
Service
District Representatives
Retail
Dealers
Wholesale
Salesmen

FIGURE 30.4

Committee Sales Organization


Sales Committee
Sales Manager
Field Manager
Manager Area 1
Manager Area 2
Manager Area 3
Manager Area 4
Manager Area 5
Manager Area 6
Assistant Manager
Assistant Manager
Assistant Manager
Assistant Manager
Assistant Manager
Assistant Manager
Dealer Service
Dealer Service
Dealer Service
Dealer Service
Dealer Service
Dealer Service
Salesmen
Salesmen
Salesmen
Salesmen
Salesmen
Salesmen

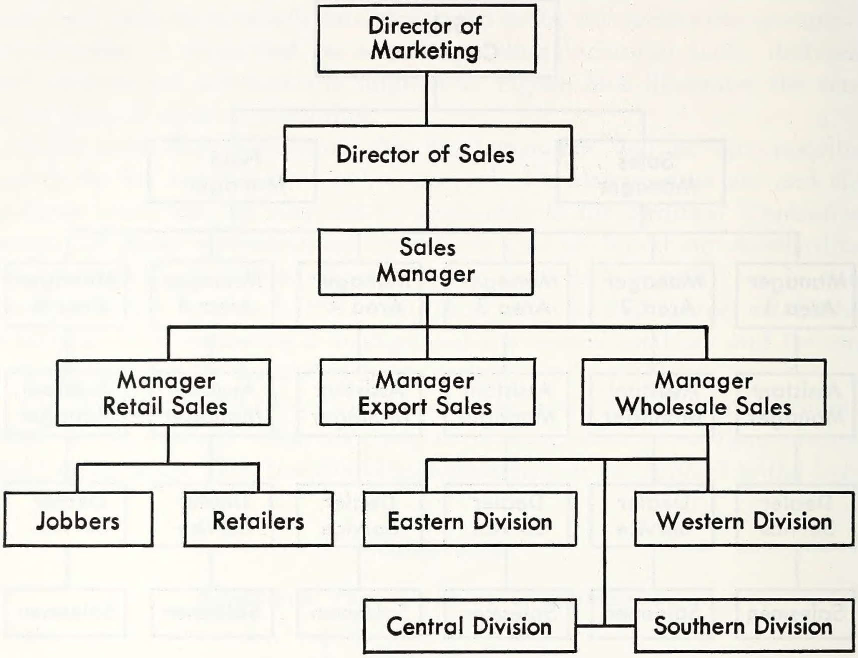
office, and if the territorial divisions operate as "marketing" units, it may also be applied to them. The chiefs of the various functional subdivisions at the home office report to the director of marketing. In a territorial setup, they report to the territorial director. The directors of the several functions at the home office perform staff services by giving information and advice to the function directors at each of the branch offices. Such contacts should not be in the nature of commands; often this information and advice are best transmitted through the general manager of the branch, for the purpose of maintaining unity of command. Territorial branches may be organized on both a product and a functional basis at the same time, if the nature and volume of the product sold warrants such a breakdown.

The number of functional subdivisions at the home office or territorial branches depends on the amount of work involved in performing any given function and on the importance of that function in over-all marketing operations. It may also be related, in part, to the personnel available for key jobs. Figure 30.3 illustrates the functional plan of sales organization.

Two other plans for sales organization are shown in Figures 30.4 and 30.5. The former illustrates the committee type of organization, and the latter shows how sales can be organized on the basis of distribution channels.

FIGURE 30.5

Sales Organization by Channels


Director of Marketing
Director of Sales
Sales Manager
Manager Retail Sales
Manager Export Sales
Manager Wholesale Sales
Jobbers
Retailers
Eastern Division
Western Division
Central Division
Southern Division

Director of Marketing

The main duties of the director of marketing are to supervise and coordinate the activities of his departments. If operations are organized on a functional basis in the home office and decentralized on a territorial basis, he will have two avenues of control and supervision. His control over home-office personnel will be exercised by direct contact and through study of reports. The same procedure will prevail with respect to the territorial branches, except that emphasis will be on reports rather than personal contact. At the same time, the director of marketing, or his chief of sales, or their personal representatives, should make periodic visits to branch offices for critical field observation.

The director consults with his chief of sales about general policies and strategy, including plans for coordinating sales efforts. He approves and aids in the determination of sales channels and the extent of sales territories. He consults with his chief of sales about the coordination of such functions as sales promotion, advertising, research and service. He is directly interested in, and responsible to top management for, the cost of sales, which he watches closely in all of its ramifications — including warehousing, whenever it is allocated to marketing. Under the pressure of increasing public criticism, the cost of sales is being given increasing attention by the chiefs of marketing and sales.

Cooperation with other departments is another duty of the director of marketing. Coordination within his own bailiwick is promoted by cooperation with outside departments. Both the production and credit departments must coordinate many important decisions with those of the sales department, and this is true only to a lesser extent of engineering.

Customer and public good will are top strategy considerations for sales, and they should be given the personal attention of the director. *Customer* good will covers adjustment of complaints from large buyers, and discounts and credit terms for customers. Visits to customer plants and branch offices often promote friendly contacts and sales. Public good will is maintained by participation in community affairs both at the home-office location, and at the branch level. Membership in local civic organizations becomes a duty of important sales personnel in the field.

Policy Decisions

Policies should represent standard decisions for recurring problems of management. These problems may affect over-all company operations, or they may have significance only for the department itself. In any case, policy statements are the result of mature consideration by two or more persons who have an over-all view of the situation. The purpose of policies, frequently incorporated into a manual, is to save the time of executives, and provide uniformity of action. Some of the major items of top-management sales policy will be discussed.

Pricing is intimately associated with sales. The volume of sales of some commodities, known as "price-sensitive" items, fluctuates widely with their prices. This is more true of consumer than producer goods. However, there may be marked differences in the price-sale relationship among various kinds of consumer goods, even in the same field. Cigarette sales, for example, do not fluctuate materially within reasonable price ranges, but cigars do. The large producers of tobacco products also report that pipes compete with cigars on a price basis more than they do with cigarettes. Ordinarily, the price of sensitive items affects their sales volume and hence the producer's break-even point.

Another phase of pricing policy is management's decision regarding the general price field it will serve. In principle, competition is keener among lower-priced commodities, but they require less capital investment.

Irrespective of the price field, there are problems of basic consideration for determining the price range. Shall the standard be what the traffic will bear, that fixed by competitors, or cost plus a fair profit? If the first standard is used, care must be exercised against loss of profits on the one hand, or loss of trade on the other. What the traffic will bear is not a stable guide. Meeting the price fixed by competitors may also lead to financial loss. Cost plus a fair profit seems reasonable for both producer and consumer. However, it too may lead to loss of business and profits if the price it fixes is not competitive. After all, the market, which adjusts supply and demand, is paramount in setting prices.

Discounts are closely allied to pricing. Management must decide what discount, if any, to grant the different classes of customers. Trade custom may dictate the decision, especially if a single distribution channel is used. When several channels are used, the answer becomes more difficult with respect not only to the amount of discount but also to the definitions of trade channels. How strictly should trade discounts be enforced?

Channels to be used in distributing products are a never ending problem. The decision affects volume of sales and production, price, finished-goods inventory, discounts and other factors. The nature of the product usually determines the sales channel. Some concerns use two or more channels in an attempt to increase volume; some decide to use a channel close to the consumer in the hope of escaping at least part of the costs of distribution; and many shift channels from time to time. There is no set pattern other than that generally used for the commodity under consideration. If the channel has been effective in the past, there is a presumption that it will continue to be so. Experience shows that many of those who use channels close to the consumer, in the hope of escaping the distribution costs of intermediate channels, merely take over the management of such intermediate channels and pay their costs. This may or may not be an advantage, depending on the circumstances.

Whether to sell through the manufacturers' agent, broker, wholesaler, retailer, or direct to the consumer are questions which must be decided on an engineering basis, with all the facts at hand. However, for most product lines there are accepted channels for distribution which have stood up under the test of time; and though custom should not be the only guide in this area, nevertheless it has proved to be fairly reliable.

Selective selling is a subject which demands an unusual amount of analysis of the factors involved. Selectivity refers to the choice of those territories, customers and products which will yield the maximum profit. It also means the elimination of those which do not yield a profit. It is one of the best plans for reducing the over-all costs of distribution. Policy determination is most difficult in applying the selective principle, and basic market changes, if not catered to, may lead to disastrous results.

Sales activity may be intensive or extensive. The former realizes the most out of a restricted territory, known to be profitable; the latter includes also those unprofitable territories which give promise of future profit. Questions as to when that future is likely to materialize, and the amount of interim losses, suggest that extensive selling may be one of the causes of the current high costs of distribution. The same principle holds for profitable and unprofitable customers in either type of sales territory. Should salesmen continue to call on unprofitable accounts, and how long must they be allowed to remain unprofitable before they are dropped?

Selectivity can also be applied to dealer outlets. Here the problem is one of deciding whether to try for mass distribution through all the dealers who will buy, or selecting only those who have the resources and know-how to push the line. Both methods have attractive features. The Thor Corporation used the mass plan for a number of years. In 1950 its president announced that "we're through with the mass distribution method of selling." Thor cut the number of its dealers from 20,000 to about 7000 "highly selective accounts."

Product changes are another problem for top-management policy. This is the type of decision that may well mean profit or loss, depending on the degree of valid prediction of current and future market trends. Since World War II, top executives have been seriously concerned with formulating sales policies attuned to markets which are radically different from those existing prior to 1940. Pronounced changes in consumer buying habits are always symptomatic of shifts in fundamental economic patterns.

Simplification of the product line refers to the reduction of the number of items offered for sale by a producer. It may also refer to the addition of pertinent new lines to take the place of those eliminated as outmoded or unnecessary. A full line naturally aids general sales because it saves customer thought, planning, and the time required in dealing with various vendors. However, the question as to when a full line has been established is partly factual and largely opinion. Management policy that comes closest to sensing the facts will be most successful in the competitive struggle for profits. Examples of simplification of product lines by as much as 50 per cent are common, and 75 per cent cuts in line items are not uncommon. Unnecessary lines mean shorter runs, higher investment in inventories, delayed shipments to customers and increased problems in purchasing, to mention only a few.

Sometimes management ingenuity is taxed when the market demands a *lower unit price without change in quality.* When a large chain store buyer demanded a lower price from his ice cream supplier, without reduction in quality, the problem was solved to their mutual satisfaction by offer and agreement to force more air into the machine-packed product. This solution involved a policy price decision on the part of the producer, but it eliminated his anxiety about any change in the break-even relation between volume and profits.

All of these factors must be taken into account in policy decisions relating to market analysis, utilization of sales manpower and the other departments of management. Upon the correctness of such policy decisions may rest the future success of the concern.

Meeting a Buyers' Market

When the demand for an item exceeds the supply, we say that there is a "sellers' market," because the producer can get rid of his goods with very little trouble and usually at a good profit, while the consumer has to take what he can get. Conversely, when the supply of an item exceeds the demand, we speak of a "buyers' market," because now the consumer has the edge over the producer: if he is dissatisfied with the price or quality of the goods and services offered by one producer, he can get what he wants elsewhere.

A truly dynamic sales program will be prepared for shifts from one type of market to the other. Obviously, it is the buyers' market which creates the greater problem for sales, and therefore the present discussion focuses on the steps that must be taken to prepare for a buyers' market.

The first step is to *increase expenditures* for expanding the sales force, for better salesmen and dealer aids, and for training of company and dealer salesmen. To offset some of these increased expenditures, savings should be sought in better inventory controls and material-handling techniques in warehouses, in decreased packaging costs and in the elimination of slow-moving products. One trade survey[6] reported favoring higher rather than lower advertising expenditures, weeding out of incompetent salesmen, analysis of distributorships for new blood and new locations, trimming of handling costs, and the examination of product lines for both pruning and additions. Besides suggesting that research and analysis be taken out of the luxury classification, the survey made the following recommendations for stepping up sales-force efficiency:

Closer control of salesmen's performances
More and better aids for salesmen and dealers
Emphasis on selective selling
Sales-training and refresher courses
Larger sales staff, and more scientific selection
Tighter control of sales expenses
Reapportionment of sales territories
Incentive compensation for salesmen
Weeding out of unprofitable orders

In discussing these recommendations, *Modern Industry* comments editorially that attention should be given to removable irritants of the sales force. The following irritants were specified: "(1) Unjust, or hypercritical, supervision; (2) insistence on pushing unsalable products; (3) sales strategy inferior to competition in any area; (4) unpopular distributor policies tying salesmen's hands; (5) too much paper work; (6) unfair or overly complicated compensation plans."[7]

Improving distributor and dealer performance is another step in successful selling on a buyers' market. Dealers must be selected with care. It is not so important to sell through a great many dealers as it is to select a group of dealers known to be competent. The producer should furnish training aids and even training programs for the distributing agencies with which he does business. Producer meetings with groups of dealers are gaining favor as a method for stimulating the dealers' salesmen by exhibits and sales demonstrations, and for general improvement in understanding and morale. Inducements for distributors and dealers should include better discounts and terms for quantity orders and steady customers, probably on a progressive schedule; progressive discounts are not illegal when savings can be shown.

---

[6] "Sales Patterns for Dynamic Marketing," *Modern Industry,* Vol. 18 (August 15, 1949), pp. 50–55.

[7] *Ibid.*, p. 51.

Cutting costs of physical distribution can be approached through analysis of such operations as inventory controls, packaging and traffic. Opportunities often exist for reducing distribution costs by increasing the number of warehouses, by locating or relocating them closer to the chief market areas, and by furnishing them with modern material-handling equipment.

In those cases where additional plants or decentralization of current production are being planned, detailed economic studies should be made of locations close to markets and raw materials.

Many opportunities exist for reducing packaging costs because of the strong competition among producers of metal, wood, glass, fiberboard and plastic packaging materials. Where the necessary strength is available in the lighter materials, freight rates are reduced.

The past decade has seen great advances in material-handling techniques for the production processes, but similar techniques have only just begun to be applied to warehousing. Until marketing and production costs are reported separately, potential savings in marketing's physical operations will receive scant attention. When the new customer interest in the high cost of distribution is armed with actual unit cost figures for that service, it will have a better weapon for demanding that the leaders in that field start experimenting for possible savings in such activities as transportation, warehousing and material handling. There are other phases of the marketing function where accepted principles of management can be applied for the purpose of reducing costs. Some evidence of this trend is noticeable among large companies, where Yale and Towne, U. S. Steel Supply and others are building streamlined warehouses equipped with the latest techniques for low-cost material handling.

The comparatively new *sales appeal,* which courts the customer eye, is based largely on attractive packaging and modernistic styling. It appears to have gained an undue emphasis when compared to the older idea of *price appeal* where the buyer is influenced to purchase the most useful item at the lowest cost. When large, artificially colored oranges are separated by orange leaves and packed in fancy boxes with cellophane lids, the emphasis is on eye appeal. On the other hand, the washing machine with simple angle iron frame without side and top enclosures is offered on the market to customers interested in price appeal. The producer emphasizes the fact that his "stripped model with the low price tag has the added advantage of easy repair and replacement of parts." Among "gadget" items, accessibility and ease of adjustment and repair are distinct sales features.

These two ideas of eye and price appeal are always in competition, and it is sometimes difficult to decide where the one stops and the other begins. No doubt eye appeal creates desire in many cases, but it is frequently stifled by the absence of sufficient price appeal. "Everybody loves a bargain. That's why nearly two thirds of all retail-store advertisements are comparative-price ads." [8] As consumer education develops, there will be more discrimination between the form and substance of consumer goods. Such discrimination has long existed in the producer goods field.

Price cutting offers a greater psychological sales appeal than low prices, especially in consumer goods. A scientific estimate of sales increase as the result of a cut in price offers a fairly accurate guide for action. For example, one large cigar-maker more than doubled his demand and increased his profits by cutting the price from 10¢ to 8¢ and using unselected filler of the same grade. Introduction of an improved article at the old price promotes sales but is probably not so effective as a price cut with the same or indistinguishable quality.

One outstanding development is the rapidity with which management is taking *market research* out of the frill category, and using it as basic information in drawing up the budget. The purpose of market research is to substitute scientific predictions for rules of thumb. Determination of territorial sales potentials, finding new products and testing their customer acceptance, rating the effectiveness of various advertising media and sales aids, surveying company sales channels, and seeking and analyzing customer suggestions and complaints are some of the jobs handed to the new marketing research department. Analysis and study of such problems are increasingly recognized as a vital service to decision and action by the general sales or marketing manager.

One of the important recurring problems handed to research is the question of new products. When competition is keen or when material shortages develop, the sales department suggests a plethora of new products, all of which must be subjected to market research and tested by engineering analysis and synthesis. Remington Rand fortifies such decisions through Product-Development Sales Committees, one for each product line. Detailed replies to twenty-four pertinent questions help prepare the new proposal for top management consideration.

The director of trend analysis for the DuPont Company likens market research to "an engineering job which must establish the same type of scientific management within the art of selling which we today placidly accept within the sphere of production." This company uses research "to discover means of boosting sales, finding new uses and developing new markets." Its fourteen trade-analysis divisions get reports from salesmen, analysts, engineers and other sources. "All of it — and it may go to 1,200,000 reports a year — is analyzed, collated, filed and kept up to date."

---

[8] Albert Q. Maisel, "How to Read the 'Amazing Bargain' Ads," *Reader's Digest,* Vol. 67 (September 1955), p. 54.

Trade and professional associations furnish several types of detailed information used for marketing research. Market indicators are available on national, state and local levels. The federal Department of Commerce issues periodic *Government Statistics for Business Use,* and the 1947 *Census of Manufacturers* started publication by industry classifications.[9]

Department Cooperation

The friendly feud between sales and production which started with the Industrial Revolution, is based on natural human instincts. Sales wants to offer buyers every possible inducement in quality, price and variety of products. Fulfillment of all buyer desires is the salesman's dream. It is this variety of sales offerings which clashes with production's overwhelming desire to produce just as few product varieties as possible; one item is the production man's dream. On that basis, the manufacturing department can establish streamlined production with decreasing costs.

If it were not for top management control, this struggle between the temperamental giants of production and distribution would stop the works. Management's problem is to offer a variety of lines while maintaining the advantages of large-scale production. The solution to the problem must be a compromise in which variety is obtained in appearances, while substantial standardization is attained through the use of common components. The automobile is an outstanding example, where colors and trimmings furnish most of the variety. General Motors operates on this compromise between sales and production ideals in the manufacture of its various types and models.

Credit control is another annoyance for the sales department, but experience has demonstrated that it is better to have salesmen become accustomed to reasonable credit controls than to have their enthusiasm add to the bad-debt account. It is only fair to observe, however, that while the sales department is too often misled by the apparent sincerity of the customer, the credit department has a reputation for attaching too much importance to financial statements. Good management can turn a poor financial statement into a good credit risk, and by the same token poor management can lead a good statement into a receivership.

Future refinement of credit techniques will be based more on appraisals of managerial capacity, and less on financial statements prepared specifically for the credit agencies. In the meantime, sales and credits must learn to live together cooperatively for the benefit of their common employer.

The marketing division has much to offer in the general councils where basic decisions in product lines are made. These decisions must present a meeting of minds among several company activities. Production knows whether the proposed change is feasible with the present machine and tool setup; finance knows whether the concern can pay for the proposed new machinery; engineering knows about the relationship between machinery, methods, controls and the skills required for any contemplated change; and personnel knows whether workers can be hired to make new products. All of these must find a way to work together to achieve company goals. When the decision is in the balance, top management has the final word and the responsibility.

---

[9] More than fifty agencies publishing market-research data are listed in *Statistical Services of the United States Government* (Rev. ed.; Washington: Office of Statistical Standards, U. S. Bureau of the Budget, Executive Office of the President, 1952).

Marketing holds a key position in the industrial hierarchy, and knows it. Unless it sells the product, as the story goes, production will be out of a job. The general purchasing budget is based on sales estimates, and so is the personnel budget. Plant expansion or contraction, and the purchase of machines and equipment depend primarily on future marketing reports. The pivotal position of marketing compels it to cooperate with other departments and makes it equally necessary for other departments to cooperate with sales. This last point may seem obvious, but when this mutuality is not achieved, each department will be in the uncomfortable position of "trying to get the others to go along."

Selection and Training of Salesmen

Some concerns hire only those salesmen who have had successful experience, on the assumption that a good salesman can sell anything. However true this may have been in the past when production had difficulty in keeping pace with sales, it is not true in today's competitive markets. Salesmen may represent a type, but the typing is too general to serve as an accurate predictor of success in specific situations. The salesman's success will depend on his reaction to the management with which he is associated, to the territory in which he operates, to the product he is selling, and to the customers whom he contacts. The problem is whether a particular man will probably make a good selling record with the product in question, made by the company considering his services, in the territory to be covered, and comprising the type of customers to be found there.

These factors make selection more difficult than picking the salesman prospect on the basis of his selling success with a different product, with some other company, in a different part of the country, and his marked ability to tell stories. Salesman selection should proceed on the same principles applied to the selection of other types of personnel. The specific job he is supposed to do should be carefully analyzed. On the basis of analysis, the necessary qualifications can be determined. In all probability, the most successful candidate will be that one who most closely meets the prepared specifications, if the analysis has been done accurately.

In addition to specific personal qualifications for particular jobs, there are certain psychological characteristics which tend to fit a person for the sales field. These are important, and should be considered before applying specific job requirements to the prospective candidate. With some companies, especially those offering various kinds of services, selling may be the most difficult part of their business. These concerns stress psychological fitness for the general sales field. Some of them make contract arrangements with specialists in psychological testing. These specialists command high fees for finding out through a battery of questions whether a candidate possesses personality traits which will fit him for the salesman's role. The prospective employer is interested in a "yes" or "no" from the specialist. Reasonableness of the fee for this type of work is often determined in relation to the cost of training. If it costs $300 for the preliminary training of a salesman, then $50 is a low price to find out that the $300 is likely to be wasted. In most cases the cost of training is much more expensive.

It has been suggested that some companies are in the habit of hiring salesmen with good producing records. Others are just as sure that they will get the best results by employing only young men for their sales force. They reason that those without sales experience may be more intensively trained in the company's methods.

Sales training may be on the job in the home office and plant, as well as in the field under the guidance of an experienced salesman. If selling is a big factor in the company's success, it may have a special training school for salesmen. Such schools always devote part of their time to the production processes, so that the new salesmen will be able to talk intelligently about the company's products. He may even be schooled in competitors' products. Another plan leaves background training in the principles of salesmanship to specialty schools or college departments.

The training period may be as short as three months or as long as two years before the salesman receives the company's stamp of approval. The period of specialized training depends on the importance of selling in the company's operations. With well-managed companies, refresher training continues as long as the salesman is employed.

Sales Quotas and Compensation

The quota fixes the volume of sales expected from a given territory during some future period. Quotas are usually fixed on a product basis, to aid the company with its production controls, and to prevent salesmen from choosing the line of least resistance by specializing on the sale of low-profit items.

The typical procedure is to fix quotas after consideration of a number of factors. Assuming that the territory is the same as it was during the previous budgetary period, the salesman's past record is important. He participates in the decisions by suggesting what changes can be expected in his sales for the ensuing period. Normally, both the salesman and the company expect some quota increase from year to year, based on improved customer acceptance and good will. The amount of advertising and development work done during the preceding period is also counted on to produce results. New products, and any improvement in general business conditions in the territory in question are also expected to affect the quota.

After considering these factors, there is a nice question of policy as to how much the quota should be set above or below the figure so obtained. Should it be set higher so that the salesman will have a goal that will really test his mettle? Or should it be set lower so that he will not be discouraged if he has failed to meet his quota at the half-way mark? One theory holds that a comparatively low quota will encourage the salesman to see by how much he can beat it — possibly a better stimulant than testing mettle of which he is skeptical. Since salesmen are different from one another, it may well be that the best solution is found in adapting the quota standard to the salesman's temperament and experience.

Compensation is a difficult problem in the sales field. Should salesmen be paid a straight salary so they can better serve the company's over-all interest rather than their own specific territory or product? Or should they be paid a base living wage, plus a commission, so that they will not be harrassed economically, and be better able to go after the commission rewards? Or should they be paid a straight commission? And if paid on a straight commission, should the percentage be stationary or changing with volume?

All of these questions have been argued time and again at meetings of the Sales Executives Club in many cities. All salesman-pay plans have advantages and disadvantages. Top management sometimes opposes the straight-commission plan because it occasionally produces salesmen's earnings above those of the company president. This is considered a morale destroyer by some, especially by those presidents affected.

To solve this embarrassment, it has been proposed that the commission be made regressive after a certain volume of sales is reached. In other words, the commission percentage should diminish after the volume rises above a certain point. This plan produces the anomalous situation in which the salesman is being paid on a lower scale for the very sales which one might normally expect to be most difficult. A simpler plan is to fix a maximum income for salesmen on a straight commission.

Amusing incidents, sometimes with serious undertones, can happen when mediocre salesmen work on commission. Suppose a five-year contract, made two years prior to the last war, provided that the lone salesman should receive $3000 base pay, plus 3 per cent of sales, and it was figured from past experience that he would earn about $6000 on the company's normal $100,000 volume. The war follows, and the government not only finances expanded production facilities to increase sales to $2,000,000 but also buys the company's entire product. The young salesman stays out of the army because his company is doing vital war work, in which he is now expediting purchases, but his earnings under his contract go from the expected $6000 to $63,000. A few companies caught in this dilemma will be likely to provide for a maximum compensation in future commission contracts for their salesmen.

Control of salesmen is another problem of marketing. The sales manager in the home office has all the estimated sales figures made up for the budget and the production department. These figures may well be the basis for control standards, particularly for the long pull. But experience has shown that the final sales figures for various territories, products and salesmen will not match the budget figures unless daily, weekly and monthly controls are applied. These controls will be more effective when the home office schedules salesmen's trips and calls on a daily basis. The salesman's daily report of calls, sales and reasons for unsuccessful calls forms an important background for home-office control. The recommendations contained in the salesman's reports often help the sales manager in formulating suggestions for the sales force.

Another phase of control is the salesman's expense account. It is important from a managerial standpoint to see that budget allowances for sales expenses are not exceeded.

Packaging

The history of packaging has run the gamut from the old country-store cracker barrel to the Industrial Packaging Engineers Association of America. Aroused by magazine articles describing the dangers to health arising from unwrapped food items, housewives demanded more sanitation in food handling. No sooner had the idea of sanitary packaging caught hold than the advertising man seized the opportunity to convert the new containers into direct advertising media. After the advent of scientific material handling, the new package was receiving attention from several points of view. (Would it fit on standard-sized pallets? Was it strong enough for unit carton packaging?) Finally, the packaging engineer brought all the ideas together to make the "scientific container." Taking stock of where we came from and where we are, especially in connection with the complaints about the high costs of distribution, many consumers are wondering whether packaging may not have outstripped reasonable bounds in adding to the cost of many commodities.

There are two general fields of packaging. One has to do with the box which the consumer receives; the other with the carton or crate in which the manufacturer ships his commodities, components or finished items. Laboratory research and design have altered the original box or barrel of our fathers until it is no longer merely made; it is engineered for size, strength and sanitation. Advertising has become an essential feature of the customer's package, and the advertising department also boasts that it has transformed the old shipping box into a traveling billboard.

There are factors other than advertising in modern packaging. For example, it is considered good salesmanship to design the container so that the ultimate consumer can use it for other purposes after the contents have been removed. This is one of the reasons for selling cheese in glass containers which can be used for drinking glasses or preserve dishes. Some varieties of fancy cardboard boxes are designed so that the housewife will want to keep them for other purposes. Certain perfumes are bought because of the artistic design of the bottle, as are also some cordials and wines. One cosmetic association reports that "packaging is the problem and the payoff in cosmetics." Packaging design is always a feature for the retail Christmas trade.

But modern packaging is designed to protect as well as promote the product, and it is the job of packaging engineers and advertising designers to balance these two functions. From the engineering standpoint, it is important to design the container so that no space is wasted, and packaging materials are reduced to a minimum. The satisfactory container is the one that can be packed easily and quickly, shipped safely and displayed effectively. To the extent that the packaging materials keep down shipping weight, transportation costs are reduced. Modern packaging provides containers that are acceptable in the factory, in transit, in retail stores, and in the hands of the consumer. Some containers can also be used for display purposes by the retailer.

Another phase of packaging has to do with export shipments. Painful experience has demonstrated the special needs in this field. Losses may be caused by rough handling, by exposure to the elements on docks, by atmospheric conditions in different parts of the world, and by theft.

Research on packaging for such purposes reached a high point during the last war. Not only was safe arrival a necessity, but insurance rates frequently depended on the type of container. The Insurance Company of North America has maintained a vigorous educational campaign on packaging among exporters, shipping companies and container manufacturers. Damage to exports not only leads to higher insurance rates, but it causes foreign importers to lose respect for U. S. products. Marine underwriters give preferential rates to the "VUS" box ("V" for victory, and "US" for underwriters' specifications), made of weatherproof fiberboard, highly sized and toughened. Moisture-proof lead or aluminum is used to protect items to which the regular protective compounds cannot be applied. In many shipments, drying agents are placed inside the container.

Packaging specifications are available from the Joint Army-Navy Packaging Board, the Department of Commerce, and the Bureau of Federal Supply. The Industrial Packaging Engineers Association of America, set up in 1945, is continually working on specifications for all shipping purposes.

Services

Many services performed for the buyer by both the producer and the retailer are so generally accepted by both sides that they are considered as an integral part of sales. In the case of producer goods — machine tools, for example — installation and servicing protect the manufacturer's business reputation, and frequently mean satisfactory operation for the buyer. In lines of this nature the producer frequently includes periodic inspections and adjustments for a year, as part of the purchase price. Two reasons for this kind of service are to keep the customer pleased, and to maintain contacts between the seller and the buyer. Producer services to machines and equipment may be handled by traveling mechanics, by service branches in large cities, or by the salesmen themselves, in the case of minor repairs and adjustments.

In the retail field, customer services are an entirely different problem. There is little general agreement about the amount or kinds of services, or indeed the advisability of any service beyond the bare minimum. Deliveries, credits, adjustments, returns and guarantees have added a formidable cost in some lines. It is estimated that up to 25 per cent of purchased items are returned to department stores. There is another and longer list of nonprofit services furnished to customers by many retailers — services as diverse as restaurants, child care, ticket agencies, travel bureaus, and organ recitals. All of these services, welcomed by the customer in the beginning, and maintained and extended by the retailer because of his desire to meet competition, are doubtless a part of good merchandising under present conditions, but they add materially to the hidden costs of distribution.

Therefore, it is not surprising to find, in the merchandising policies of the dime stores and supermarkets, a swing of the service pendulum in the other direction. In both of these retail outlets, the services are even more meager than those performed in the "good old days," when services were notably simple and the cost of distribution small. In the typical dime store or supermarket, the customer waits on himself, pays cash and delivers his own merchandise. Returns are usually restricted to merchandise that is definitely substandard. This new style of merchandising appeals to the consumer because of the low prices it is able to offer; it seems inevitable that such practices will eventually have an effect on marketing practices in the producer field.

Conclusions

The high cost of distribution is the outstanding subject for controversy in the field of marketing today. Although there is continuous complaining by consumer groups and organized opposition by cooperatives, the advertising fraternity has rather successfully spearheaded the defense. Improved standards in the various phases of marketing appear to offer the best means of reducing distribution costs at this time.

Organizational patterns better suited to their purposes offer another opportunity for the improved management of marketing. Better planning and more effective controls are always worth considering. Improved sales methods and "truth in advertising" are being promoted by national organizations interested in marketing.

Marketing research will probably work out some fundamental improvements which will benefit all parties concerned. The process will be slow, but it will be objective. Objectivity has been conspicuously lacking in too many of the discussions concerning distribution costs.

QUESTIONS

1. What activities are included in the field of marketing?
2. Do you think that the cost of distribution, as compared to production costs, should be reduced, and if you do, what are your suggestions for accomplishing it? If, on the other hand, you believe that the ratio should be increased, give your reasons.
3. Make an organization chart for a distributing concern operating on a territorial basis.
4. How would you organize the marketing function of an industry with three branch plants?
5. What are the chief duties of the director of marketing, and what qualifications should he have to perform those duties?
6. Selective selling is a policy decision which top management should make. If you had that responsibility, how would you apply it to a company distributing its products on a national basis?
7. Why is it that the prices of sensitive consumer items fluctuate more widely than they do for producer items?
8. How does product simplification affect prices, and how would you combat customer resistance to the change?
9. What are some of the factors and controls of a dynamic sales program in a buyers' market?
10. What basic idea would you use for obtaining variety in your product while simplifying the production processes?
11. Why is it that management has been showing a greater interest in market research during the past decade?
12. With what departments of an industrial business must the marketing function maintain closest cooperation, and why?
13. Why do some customer accounts frequently produce strained relations between sales and the credit department? How would you go about trying to ease that strain?
14. How should salesmen be selected and trained for marketing speciality items?
15. What should be the basis for fixing compensation of salesmen handling machine tools? Would you place a top limit on their earnings? Defend your answers.
16. Do you feel that packaging has gone too far in adding to product costs? If so, give an example of such an unnecessary expense. If, on the other hand, you are satisfied with the present packaging situation, would you favor its adding to total product expense? Under what circumstances, and why?

17. Do you believe that some of the marketing "services" could be dispensed with to the advantage of the consumer, and without detriment to the producer or distributor?

CASE PROBLEM

The Bradley-Evans Company

The Bradley-Evans Company has been making industrial knives for about seventy-five years. Until the past decade, the concern's profits have been satisfactory. It has an established reputation for high quality, both in meeting customer specifications and in its own suggestions about design.

The transition from annual profits to losses has been due largely to job-shop methods. However, it is also true that the company has built its reputation and volume of sales on meeting all customer desires for quality knives. Because of its good reputation, the company does a large mail-order business. Salesman training requires at least six months in the plant for becoming acquainted with processes, kinds of steel and the potential productivity of the various shops making the product. Because of the multiplicity of products, it takes considerable time for the salesmen to become familiar with the various shapes, sizes and grades of knives and handles.

It is unusual for Bradley-Evans to receive an order for more than a dozen knives of the same specifications. Another problem is the habit of customers, even the large concerns, of placing frequent small orders, apparently in an effort to save themselves the expense of carrying excess inventory. It is not unusual, for example, to receive an order for five each of several different types of shingle or corn knives. This customer habit of buying on a hand-to-mouth basis obviously increases production costs.

The multiplicity and variety of small orders has made it difficult for the concern's semiskilled machine operators to become adept at their work. As a result, it has been necessary to requisition enough material from central stores to make about fifteen knives when the order calls for twelve, to allow for possible spoilage of materials and defective workmanship. There has been no problem in getting the customers to accept overruns of from one to three knives, but on some of the more difficult items, the material allowance is often insufficient to fill the order. In such cases, a small supplementary order must be processed.

Bradley-Evans had a survey made of its operations. The report recommended establishing product standards for its line of knives, as the basis for simplifying their variety. It was also learned that the continual adjustments for numerous small runs had shortened the useful life of many of the machines, which would soon have to be replaced. The survey showed further that the large number of small orders was causing some of them to be lost in the plant. When delayed delivery brought customer complaints, the order had to be duplicated at a direct loss. It was found that these lost orders were ending up in the "surplus stock" room. (Management had been going on the assumption that this "surplus stock" was made up simply of overruns.)

As a result of the large number of small orders, the company is compelled to carry large inventories of strip steel in many sizes and qualities. The number of jigs, blue prints and patterns gives ample evidence of the complicated production situation which has been allowed to develop. The storage space for jigs and patterns was expanded recently because of the difficulty in locating items desired for repeat orders, many of which are marked "rush."

It is evident that Bradley-Evans needs more than product simplification, but the report of the consultants has convinced the company president that most of their trouble is coming from too much product diversification — a situation which has been growing gradually worse over the years.

PROBLEM. What program would you work out for marketing the company's products, to put it back on a profitable basis? Enumerate the steps you would take and the information you would need to reduce its product line to a reasonable and fairly acceptable basis. How would you get the company's old customers to accept your new sales policy?

CHAPTER 31

Office Management

Office management is distinctly a process of getting details accomplished through the efforts of others. The central office of many concerns must do most of its work on a daily schedule usually following the pace set by production and top management. As with all managed activities, planning, organization, direction, coordination and control are the prime tools for effective results. One specialist in office management has defined the subject thus:

> Office management is the manipulation and control of the elements of an organization (men, materials, methods and machines) so as to produce the best possible results (quantity) of the highest possible quality at the least expense and effort in the shortest possible time so that the results will be acceptable to top management. In the office, *control* is the objective and *time* is the essence.[1]

In small or medium-sized concerns, the general office may also take care of its own personnel and purchasing requirements. Although such a practice may promote coordination, the advantage is largely dissipated by the fact that the persons in the office who are assigned responsibility for performing these functions are rarely trained in the best personnel and purchasing techniques.

Executives on all layers of an organization have office work of some kind, and should make use of the established operating principles of office management. One essential difference between the large and the small office is that the large office permits a much higher degree of specialization. But office activities must be coordinated whether they are performed by one or several hundred employees. In the small office, control is necessarily a matter of self-analysis, and is correspondingly ineffective as a general rule.

The average executive thinks of three factors when considering the efficiency of his office. First is the cost of office work as related to sales volume. The other factors are productivity and the quality of the work, both of which have an important effect on costs as related to sales. If an executive studies the history of costs of managing offices, he will become interested in improving the efficiency of his own. In the early part of this century, the records show an average ratio of one office worker to ten plant workers. Now, owing in part to the increased complications of office work, the ratio is as low as one office worker to five production workers. Lack of progress in the scientific management of office work shares a large part of the responsibility for this poor showing. No wonder students of the subject feel that the office revolution is overdue.

---

[1] Harry L. Wylie, "New Frontiers for the Industrial Engineer," *Advanced Management,* Vol. 16 (April 1951), p. 7.

Extent of office work

"The main functions of the office are to put into written form, and to make available when needed, the ideas, plans, promises, agreements, and records which, under simpler conditions, would be kept largely in the mind of one person."[2] General office work includes records, computations, files and both internal and external communication.

Records cover a multitude of transactions such as financial reports, accounts receivable and payable, payrolls by classifications and rates, and other company transactions which may be needed for reference by any of the executives or service departments.

Computations are one of the main activities of the general office. Payrolls, discounts and other financial transactions, bank accounts, reserves, dividends, statements and statistical work of various kinds, including that for general management controls, are representative of general office computations.

Filing is the orderly storing of papers and records so they are immediately available when called for. An effective filing system must be planned to make back records as easy to locate as current ones.

Communications are of numerous types for both internal and external exchange of ideas. Within the company there are conferences, activity memos and instructions. Outside communications consist chiefly of letters, telegrams, transcribed telephone conversations, orders and contracts.

The office also acts in a purely service capacity for all other activities of the company. It performs such supplementary or facilitating services as duplication, mail, messenger, office supplies, reports and often reception, in addition to the major activities already mentioned. Effectiveness is judged by ability to render services adequately, correctly and promptly. Not only the nature of the work, but its volume and scheduling are dependent on the functions which it serves. For example, the volume of office work will fluctuate with the peaks and valleys of the workload in the production department or with such financial operations as collections, payrolls and fiscal statements. This situation makes comprehensive planned scheduling difficult for many office services. Since one of the problems of office management is to devise methods for leveling its workload, the necessary changes must be worked out in cooperation with the departments served.

---

[2] Henry E. Niles, "The Office Manager's Job Today" (New York: American Management Association, Office Management Series No. 100, 1943), p. 3.

The office manager

The extent and effectiveness of office work is largely dependent on its manager, irrespective of his title, which may be office manager, controller or chief clerk. In any case, the person who has charge of office work must have a thorough knowledge of his department's or company's operations. If he has charge of a general office, his knowledge must extend to all departments of the business because he must cope with problems involving interdepartmental relations. He must have some research ability, be able to analyze situations for better planning and methods, be diplomatic, and know how to sell his services to the operating departments.

The manager of a large office should have executive ability, along with a background of training and experience in the work. He must be patient and cooperative, critically creative, and possess facility of expression for building acceptance of his ideas and for making effective reports. The office manager who has these qualifications will find a real challenge in working out solutions for his personnel, methods, layout and general management problems.

Office problems

Office problems may be divided into three general categories: organization, management and techniques, and they will be considered in that order. Because office management is classified among the "nonproductive" activities, it has received relatively little attention until recent years. A growing recognition of the relation between office management and the work of the so-called productive activities has led to more serious attention to the possibilities of applying scientific principles to office operations. Some of the activities here have been crying for correction for a long time.

Organization

As with other activities, the type and extent of office organization should be determined by the nature and number of its objectives. Obviously, the activities for obtaining these objectives must be aligned on a functional basis in the order of their importance, and with due regard for their relationships with other departments.

Before discussing internal office organization, consideration should be given to its place in the company's general organizational scheme. The operating or production, finance and sales functions are usually considered of paramount importance in any business organization. The engineering, legal, personnel and purchasing functions often rate second place, although their rank depends largely on the relative importance of their services to individual concerns. All of these activities serve operations or production, finance and sales. Office work is in the same category if it is centralized to serve the whole company, but of lesser importance organizationally if its activities are dispersed throughout the company's departments.

The rank of office services in the general organizational pattern depends on their importance. In an insurance, distributing or financial organization, office work is of major importance, and the office manager should assume an important position in the organizational hierarchy. In an industrial concern, his importance would be somewhat less. If office work within the concern is highly centralized, the office manager's position is more important than it is in a decentralized scheme where the work is done within the several departments.

The Office Manager's Boss. To whom should the office manager report? This is simply another way of asking about the relative importance of office activities. In a financial organization, the office manager will probably report directly to the president of the company. If, on the other hand, the office function is less important but highly centralized, he may report to an executive vice-president, or to the vice-president in charge of finance. When the importance of office work, even though centralized, is considered minor, it will probably be placed under the control of the treasurer or controller. When the general office of small and medium-sized concerns acts as a purchasing and personnel department for the entire company, its enhanced importance may again bring it under control of the chief executive officer.

Office Personnel and Purchasing. Is it advisable for the general office, or the departmental office, to perform its own purchasing and personnel functions? In the large company, where separate personnel and purchasing departments have been set up to serve the entire company, it often happens that the office management claims a special status for its activities. "Our personnel and purchasing problems are unique," the argument runs, "and therefore we should perform these two functions ourselves." But this is the old argument, so often raised by line officers in every department, that service functions should be decentralized and placed in control of the departments directly concerned. The reasoning is no more valid for the general office than for any other department. The personnel and purchasing departments can almost always do a better job than the general office could do for itself.

Centralization versus decentralization

Centralization of office work refers to the physical handling of its activities in one place, and subject to the control of one person.[3] Under an overall centralized plan, correspondence and filing for the entire organization are done by sections of the general office. The decentralized form of office organization assigns office workers to the departments concerned. Both of these plans are pure types not often found in actual practice. If either type is adopted, experience dictates shifts one way or the other because of the disadvantages encountered, or the suspected advantages of the other type. Both schemes of organization have advantages and disadvantages, often leading to some sort of combination, in an effort to secure the advantages of both types. Before adopting any combination plan, it is well to consider the advantages of the two types.

---

[3] Centralization may also refer to the method of handling work within the office itself. Examples of this kind of centralization would be stenographic and filing pools.

Advantages of Centralization

1. Improves utilization of personnel and facilities
2. Enlarges opportunities for training and pay raises
3. Facilitates improvement and uniformity in methods
4. Increases specialization among the workers
5. Decreases costs of supervision

Advantages of Decentralization

1. Encourages specialization of departmental work
2. Improves supervision of those directly interested
3. Personalizes control over office employees
4. Increases opportunities to develop versatile workers
5. Minimizes delays in departmental routine

A combination plan customarily assigns the writing and filing of confidential correspondence and contracts to the operating departments, while correspondence and filing of a general nature, as well as messenger, mailing, duplicating and communication services are centralized in the general office. The extent to which correspondence and contracts may be considered confidential depends on the nature and size of the concern, the repetitive nature of its office work and the attitude of its executives. Trial and error usually determine the effectiveness of various combination plans, many of which represent shifts in emphasis due to reorganizations and executive caprice. The outstanding example of shifting control is in stenographic work, where the "pool" and individual service plans alternate with each other as their relative advantages and disadvantages come to light.

A further refinement of the combination plan assigns stenographers and various types of clerks to individual departments, subject to general control of the central office. This method attempts to take advantage of better training methods and improved worker satisfaction resulting from company-wide clerical classifications with standard wage and salary scales.

Management

Scientific approach

The scientific approach is just as important for effective office management as for production or any other function, and is applied in the same manner. Any normal activity has problems which can be settled on the basis of personal hunch (rule of thumb) or be solved by the scientific approach, tempered by common sense. The scientific method simply breaks down the specific problem into its components for the purpose of study and analysis. The problem itself may be dynamic, presenting a difficult situation for analysis. Its isolated components can usually be reduced to static "pictures," an almost necessary condition for analysis, synthesis and conclusion.

Finally, the theoretical solution is applied to the problem in actual practice, where it again becomes dynamic, and where its results can be observed under the changed conditions. The degree of satisfaction obtained, or the opportunity for further improvement, can thus be measured. The scientific method is not difficult to understand, but its application often requires sustained mental effort which probably explains the resistance it often encounters.

Delegation

Delegation of responsibility and authority is a leading principle often neglected in office management. Delegation of a single full-time activity may be easy in a large office, but practically impossible in a small one, where two or more duties must be assigned to the same person. Delegations need not be confusing to the worker in a small office if his assigned activities do not overlap those of some other worker, and if the assignee's supervisor is clear and distinct for each assigned duty.

The problems of delegation in office work arise from two chief sources. One is the failure to apply the principle often enough. The other is the failure to assign sufficient authority to carry out effectively the responsibility involved. It is sometimes contended that there are situations where authority should be restricted until the worker has proved himself capable of exercising it. One answer to this attitude is that full capability cannot be tested until full authority has been given. Another answer is that commensurate authority and responsibility tend to promote individual initiative.

The solution to the delegation problem rests largely with the supervisor. There are supervisors who seem to have a fixation against delegating responsibilities except with mental reservations. At the other extreme, is the supervisor with a penchant for delegating all his responsibilities if possible. Naturally, the correct position is somewhere between these attitudes.

Planning and control

The complementary functions of planning and control are just as important in the office as in the factory. Control is the checking of performance against plans. When the objectives of the office operations have been clearly formulated — and this will always involve policy decisions on the part of top management — then plans can be devised for carrying out these policies in action. Plans set up standards, in terms of which performance can be judged as satisfactory or "out of control."

As we have seen in earlier chapters, standards run the gamut from the very simple to the very complex. The motions of the individual operator can be analyzed to discover the one best way of performing an operation, and this one best way is then established as the *standard method.* In the same way and on a level of greater complexity, all the operations and standard methods involved in the performance of an entire activity by any number of employees, can be formalized in a *standard procedure.* Finally, these procedures can be integrated with one another into *systems* which operate almost automatically. These are not the only forms of standards and control, but they are very important tools. The virtue of setting up such standard methods, procedures and systems is, first, that they make many decisions automatic, freeing executive time for exceptional problems and, second, that when something does get out of control, the existence of standards makes it easy to locate the exact source of the trouble.

In Chapter 16 we saw how production-control systems are made up of routing, scheduling and dispatching procedures. Similar procedures can be applied with equal effectiveness to the establishment of office routines. A single transaction can become very complex, involving operations in several different departments. For example, the purchase of an article is of primary concern to the purchasing department and to the department which will be using it, but the transaction may comprise operations in the receiving, inspection and accounting departments as well as in central stores. The records of all these operations are likely to be centered in the general office. If the transaction is to flow smoothly and economically, procedures must be standardized and systems must exist which will provide for the coordination of all these procedures.

Systems. The importance of a system lies in its ability to establish and maintain order among multifarious transactions. A system associates related parts to the whole. In doing so, it reduces the cost and physical energy expended in clerical operations, and saves managerial skill from attention to recurring clerical problems. It also aids in fixing responsibility and establishing controls.

Business organizations and operations are decidedly dynamic. To be constantly effective, systems must be kept in tune with the functions they serve. "System is *regulatory in nature* and not within itself constructive, although it may be a means of simplifying constructive effort." [4] This means that systems must be subject to periodic review so that they continue to be helpful in serving the dynamic activities of business. A frozen system that no longer serves its purpose can be worse than no system at all. The lack of system at least permits flexibility, something which a frozen system prohibits. Finally, any system must be judged by the relation between its operating costs and the value of its accomplishments. Not all systems can justify their existence when submitted to the cost test.

---

[4] William R. Spriegel and Richard H. Lansburgh, *Industrial Management* (5th ed.; New York: John Wiley & Sons, Inc., 1955), p. 4.2.

Because they often cross functional and departmental boundaries, systems should either be set up by someone close to top management or be subject to this person's review, so that they do not cause confusion in the over-all organizational structure and policies. This requirement is emphasized when a group of systems, each fairly complicated in its own right, must be coordinated with one another to serve the company's common purpose.

Procedures. Systems are made up of a number of procedures. Each established procedure should apply to a single phase of office operations. It should also provide for the coordination of that activity with both general office operations and the related activities of other departments.

A procedure establishes the sequential steps of an activity. These steps are often formalized by inclusion in a manual, sometimes referred to as the procedural manual. Since procedures simplify and guide repetitive tasks, they minimize the need for decision-making by superior executives. Aimed at reducing wasted time, they speed operations, as well as provide for uniform practices. They save cost of operations, lead to improved results and fix responsibility for errors. Procedural manuals are also valuable in training new office employees.

A procedure should be installed only after a thorough study of all office operations. A static picture of these operations is best displayed by a process or flow chart, which should first depict activities as they exist. The manual should not be attempted until a comprehensive study has been made for improving existing operations. Such a study may point to possible eliminations, simplifications, combinations or changes of sequence. After the study, it is usually possible to make an improved arrangement of office desks and individual offices to facilitate the flow of work. A critical analysis of the operations invariably leads to improved procedures.

Procedures may be appraised fundamentally on the basis of the time, effort and money expended in operating them. They should be fitted to the needs of a given activity and be acceptable to the persons who perform the tasks which they outline. To obtain maximum effectiveness, one should not be unduly influenced by a "canned" procedure or by what some other company is doing. In other words, the best procedures are tailor-made to fit the activities they serve. The objective of each procedure should be accomplished with a minimum of detail. A standard procedure is no more useful nor acceptable than a standard form of organization.

Paper-Work. The central theme of office procedures is paper-work. It looms so large in the daily office routine that increases in the volume of paper-work are often erroneously thought of as "progress." All paper-work should have a definite objective. Its extent and volume should be the minimum necessary to accomplish the purpose, and anything beyond that minimum is properly referred to as "red tape."

The number of forms and statistical compilations is often excessive, and so too is the number of copies made of either. For example, how many copies should be made of the purchase order? Evidently the mystic number seven was adopted by the original purchasing agent and has ever since been perpetuated by his descendants and the textbooks. The number required is that which can be used effectively in any particular company. More than that results in cumbersome filing and useless work for those to whom the unnecessary copies are channeled — assuming, of course, that they are given any attention at all.

And who started the idea of sending two copies of every letter to every addressee — one for reading and the other for filing? Many government agencies have adopted this plan as common practice. Occasionally the addressee may want an extra copy, in which case he himself should have it made. How many copies of letters should be made for the sending company's use? It depends on the circumstances. It may be reasonable to make two or three copies for executives concerned, in addition to the one for the central files. It is not difficult to determine a standard number of copies based on the subject matter involved.

Other Forms of Office Control. Systems and procedures have been singled out here as particularly important tools of planning and control. It should not be forgotten that a procedure or a system is itself a *plan* — a plan for handling all the routine decisions which can be foreseen in the normal course of operations. There are other aspects of office planning and control, however, which cannot be entirely reduced to a standardized procedure or system.

The control of office work includes the direction of its employees' activities so as to maximize productivity, quality and service at least equal to accepted standards. But not all office controls can be maintained by the application of scientific techniques. Some important controls are best maintained through direct contact between the superior and his workers. It is difficult, for example, to maintain standard productivity in the repetitious types of office work except through inspirational supervision and direction. The control of costs is another difficult and important aspect of office management. It demands continuous supervision and frequent shifting of approach to prevent the lessening of its effectiveness.

Reports on office activities are one of the standard means of control. The conclusions and recommendations flowing from good reporting help office supervisors as well as those in other departments. But good reporting is impossible without adequate and timely records. In a very real sense, therefore, some office controls are dependent on records which have been adjusted to the purposes of control under a special set of circumstances. So the question of what constitutes good reporting is pertinent to the internal control of many office jobs.

Brevity, clarity, timeliness and sequential presentation are the outstanding criteria of all reporting, but particularly of those reports issued by the central office. Visual presentations such as charts and graphs are particularly useful in forecasting and saving the time of executives and supervisors. In addition to the day-to-day control of office activities, an audit of general operations should be made periodically. To minimize the possibility of neglecting some phase of the work, a well-prepared audit check-list is a necessity. Such a list should be expanded from time to time as experience demonstrates the advisability of getting closer to the fundamental causes of difficulties in managing the office.

The measurement of values against the cost of office records and reports often results from adequate check-lists. Attempts are often made to establish the value of records and reports by the extent of their distribution. Obviously, use rather than distribution is the determining factor. Measurement and control of office personnel should follow, in part, from a considered application of the results shown on their service records.

Techniques

Simplification

The simplest way of performing any task is the best way. The prime tool for performing more office work better and with less effort is simplification. Another important result of simplification is reduced costs, in which management is always interested. Simplification may be applied to office organization, its machines, its methods and its layout. In addition, simplified office procedures and methods should improve forms, records and reports.

The application of the principles of scientific management to office principles and practices was first undertaken, about 1925, by the late William H. Leffingwell. Much progress has been made since that time, but compared to the possibilities, it has been relatively insignificant. The two chief reasons for delayed progress are those usually encountered — general antagonism to change, and the common belief of office managers that their job is different and apart from the usual run of management problems. Actually, office work is susceptible to the same kind of analysis as the production processes.

The specific reasons for the slow progress of scientific techniques in office management include the following beliefs of office managers:

1. Operation inefficiencies in the factory are observable immediately as unreasonable costs, which is not true in the office.
2. Standards are more easily set in the factory than they are in the office.
3. Factory errors are easily visible as scrap, while office errors are corrected without visible increase in costs.

4. Factory work is more repetitive than office work, which is therefore less susceptible to standardization.[5]

Primary simplification in office work comes from a regular flow of work and effective management. Simplification of methods adds refinements to the flow of work. Paper-work should flow from desk to desk, based on a suitable physical layout. Office work must be pictured on flow charts for major activities, and on process charts for individual operations. It is only by the study of such charts that dependable improvements can be made with respect to movements, operations, interruptions and inspections. Non-productive time can be easily spotted and minimized. Combinations of individual activities will suggest themselves, as will changes in the sequence of operations. For example, a simple but too customary practice in office management is the assumption that all filing cabinets should be placed along the wall, whereas the frequency with which the filed materials are consulted is the only rational criterion for determining their location.

Standardization

Standardization formalizes simplified procedures. We have already spoken of the peaks and valleys in the office workload. There is an unfortunate tendency to hire office personnel on the basis of demand at the peak of the workload. Whereas most office managers complain that they are understaffed, the truth is that if they applied the methods which production has worked out, they would often find themselves overstaffed. The scheduling of workloads and the timing for work standards should be set up only after a proper layout of desks and offices has been accomplished. Standard times for operations are absolutely necessary for proper scheduling and the best use of personnel and equipment. Most utility organizations have learned that they can level their workloads by reading meters and sending bills on a geographical basis, spread over the days of the month. Most office work can be subjected to the same principle on some different basis.

The need for standardization of office forms is obvious when one observes the numbers, sizes, colors and composition of existing ones. Not only the different numbers on invoices, job orders, tickets of various kinds, requisitions and routings, but the different locations of these numbers on the different forms, is baffling and time-consuming. Without standardization, supervisory or top-management control is illusory, if not impossible.

Standardization establishes definiteness in operations as well as in duties and responsibilities. The duties of office workers, as well as the methods of their operations, should be definitely worked out and reduced to writing in an operational manual. Standard workloads for various activities are important in work distribution, planning and control. They are also a morale booster in that they make it clear to every employee just what is expected in quantity and quality of work to be performed. It takes the guessing out of the eternal question, "How am I doing?" Office standards are important as they apply to methods, workloads, machines and equipment. Workplace layouts should conform to the best operating standards, and office layout should conform to the most effective flow of work. The capacity of the general office is sometimes unnecessarily reduced by setting up private offices for supervisors. Private offices can interfere with as well as expedite the flow of work, and very few of them are conducive to supervision by observation. These comments do not apply to offices devoted to planning and controlling, two high-level occupations, which cannot be combined satisfactorily with supervisory duties in a large concern.

---

[5] W. C. Perry, "Why Work Simplification in the Office?" *The Journal of Industrial Engineering,* Vol. 3 (August 1952), p. 7 *et seq.*

Centralization

The assembling of scattered office activities into a single department increases the opportunities for superior services at reduced cost by the use of modern office machines and equipment. Most office work is more dependable when done on machines. In addition, machine operations invariably increase office productivity.

When office work is centralized, it is easier to train workers to acquire multiple skills, in preparation for periodic shifting of personnel between peak and valley operations. Another contributor to improved office management is the superior working conditions of the past decade.

More attention should be given to grouping, within the centralized department, the so-called secondary office services, including typing, duplicating, calculating and filing operations. These services are customarily improved by the specialization which results from centralizing them. In addition, peak-and-valley workloads can be still further leveled through the improved scheduling made possible within these centralized groups.

The advantages and disadvantages of centralized service units must be weighed in reaching decisions. For example, it is often claimed that middle and top executives are hampered in their work by pool assignments of stenographers for secretarial work. The executive prefers the services of one secretary because she is acquainted with his problems and his vocabulary. The contention has considerable merit. The only solution seems to be full-time secretarial assignments for such executives. Their desires do not, however, vitiate the principle that the greater portion of stenographic work is better performed by assignments from a stenographic pool. The question of filing is another case in point. To what extent should filing be centralized, and when should files be maintained in the using departments? The answer depends on the amount of use required by those departments which insist on decentralized filing.

Finally, there are technical phases of office work which can be used for different types of control. The office organization chart is an over-all guide for control. Flow and process charts are other important guides for the improvement of office management. Time study and workload charts of activities are necessary for proper scheduling. Job analysis and the training of individuals to perform two or more office jobs are helpful in leveling workloads. Analysis of office employee turnover through qualified exit interviews helps reduce worker complaints and leads to improved satisfaction and output. Report and office-forms analyses invariably reduce office workloads, as does also a functional floor plan. Finally, budgetary programs control over-all costs.

Physical Facilities

Office location

Some businesses, such as insurance, real estate and banking, are fundamentally office operations. The location of their offices depends on the nature of their services and the type of customer they serve. However, because of the "office revolution," factors once considered paramount are giving way to new considerations in many offices. For example, large insurance companies have been moving from central office buildings to the suburbs of large or medium-sized cities. The availability of parking facilities is one reason for the shift, but increased productivity resulting from a more appropriate environment is more important.

Industrial concerns occasionally have their office or administration building located at some distance from their plant, but the more prevalent custom is for factory offices to be located in the factory building. Within the plant, the top floor is occasionally chosen because of better natural lighting and reduced noise. The ground floor, on the other hand, offers easier access for outside business visitors, and is more generally favored. Unit or specialized offices may be located adjacent to the department they serve. Similarly, large one-floor industries occasionally have office units of the personnel department located at strategic workplaces throughout the plant.

The purchasing office is frequently found to one side of the main entrance, probably to keep active vendors' agents away from the production quarters, as well as to offer prompt service to the traveling fraternity whose time is limited by their own home-office scheduling. Availability, adaptability, light and ventilation, nearness to such employee facilities as washroom, proximity to industrial operations, and over-all costs — all help determine the office location within the plant. Sometimes it is decided that these advantages can best be obtained by having a separate office building adjacent to manufacturing operations.

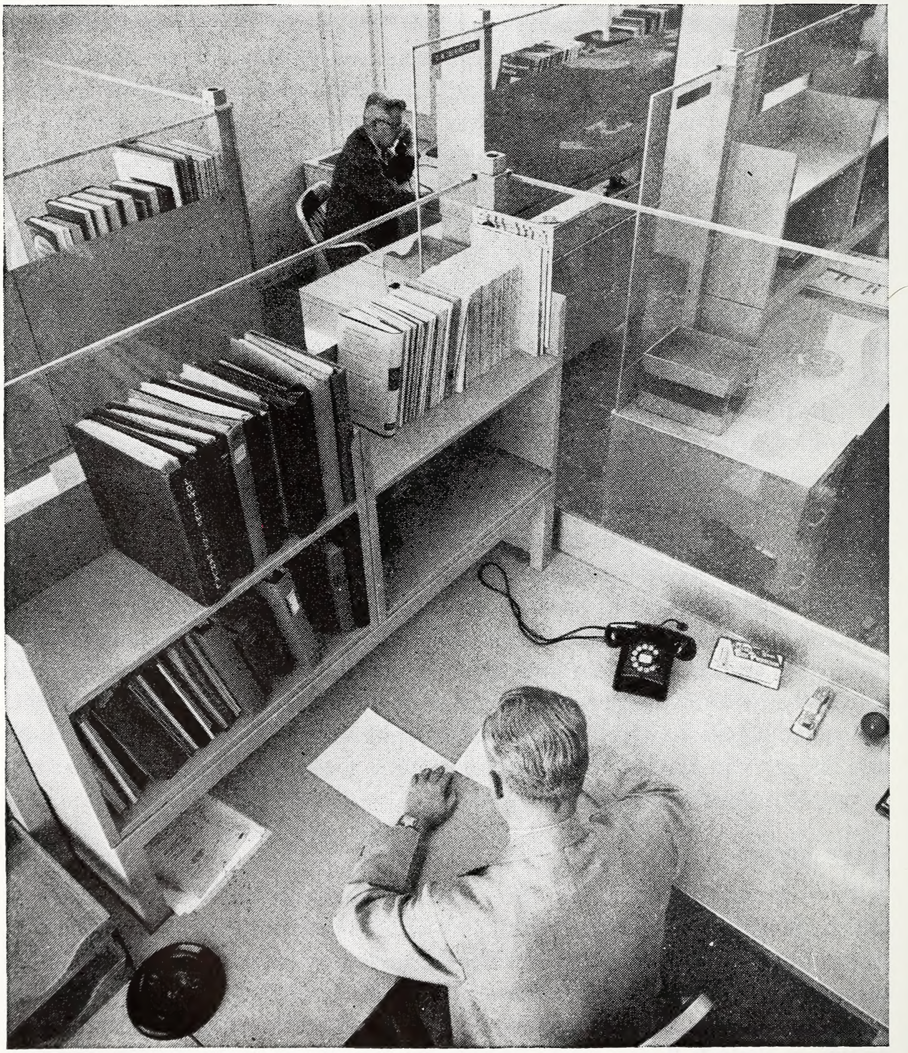
Office layout

Two important factors of office layout are a continuous flow of work and a pleasing appearance. The flow chart aids in applying work-simplification principles to office jobs. The basic principles include the maximum of simplification of both activities and motions, the elimination of unproductive motions, and the arrangement of processes so as to establish a continuous work flow.

Office appearances are important morale boosters, leading to improved productivity. The study and application of color dynamics have become a technical aid for all kinds of work, in the office and shop. Lighting engineers have established beneficial standards. Finally, suitable equipment is needed to complete a suitable office environment. In many cases, the former private office can be replaced by the new "modular" office arrangements worked out by DuPont engineers. Figure 31.1 shows a group of the

FIGURE 31.1

Functional Unit Offices



Courtesy: E. I. DuPont de Nemours & Co.

new DuPont offices. They are semiprivate and provide office space for a much larger number of workers and minor executives and supervisors than does the "private" office grouping. Complete use of available space by DuPont-developed functional furniture is shown in the photograph. The office units are so flexible that many variations are possible. The company reports that this arrangement provides a degree of quiet, privacy and prestige not possible in open areas with conventional furniture. This new office arrangement is the result of seven years' development by company engineers. The building in which this photograph was made contains seven hundred of these functional office units, each with a combination desk, table, file, cabinet and bookcase.

Figure 31.2 shows the type of office from which the modular units are descended. The photograph speaks for itself as an item of historical interest. It is evident that space was not at a premium in 1895 in San Antonio. It appears, however, that a woman had already invaded the office precincts. The men, although apparently conscious of the fact that their picture is being taken, give evidence of leisurely habits. This was before the day of federal government reports and controls. In spite of the fact that this gas-lit office may appear almost archaic, its ratio of clerical to production workers was about one to ten compared to today's one to four, or worse.

The answer to rising office costs must be found in the use of better equipment, better methods and better surroundings. Management has control of these factors. One large producer of metal office furniture has summarized the situation in this way:

> It costs any company at least $3000 a year per employee — for salary, floor space and overhead — to operate its office. In an office of only ten employees, this means $300,000 over a ten-year period. For only 1 or 2 per cent of this fixed expense, the office could be outfitted with the finest, most modern, most economical and efficient metal office furniture, plus the best in lighting and decorations.

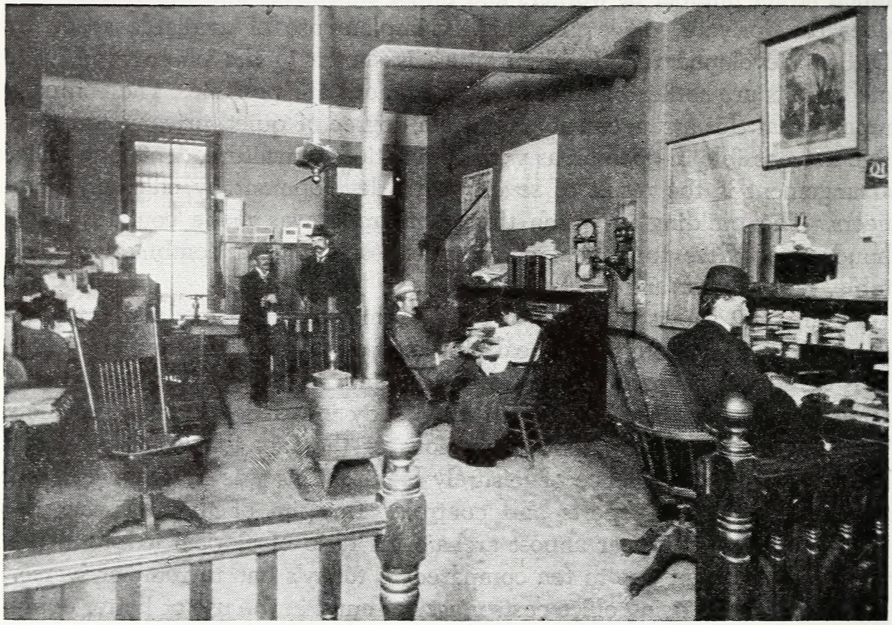
Good office layout and appearance not only improve employee morale, but customer relations as well. The fact that offices in the "office business" — banking, insurance — are almost invariably more attractive than those of industrial concerns is attributable in large part to the dominance of the production department in the typical industrial enterprise and the consequent neglect of the positive values to be gained from making offices more attractive.

Office machines

Someone has rightly said that "office machines are the machine tools of management." The revolution in office machines during the past decade or two has been quite as fascinating as the progress of the textile machines during the first two decades of the Industrial Revolution. From all reports, office-machine progress of the next decade promises almost unbelievable results. Recent mechanical advances have expanded the range of mana-

FIGURE 31.2

A Typical Office of 1895



Courtesy: Traveler's Insurance Company

gerial control, thus making big business more amenable to the guidance of executive centralization. Beyond the immediate horizon, office machines are promised that will make the increasing piles of paper work much smaller than those of the nonmechanized offices at the beginning of the century. The pressing twin needs of decreased costs and increased executive control will hasten the day of office-machine improvements.

Man's first calculator was known as the abacus, a series of beads on rods, dating from the sixth century B.C. Remington produced the first typewriter in 1874. Even with Remington's promise to supply operators for this new gadget, only one thousand machines were sold during the first five years. One cause of sales resistance was the feeling that the new machine was a reflection on the correspondent's handwriting.

In 1886, Herman Hollerith, of the Census Bureau, invented a machine for making statistical analyses from punched cards. Then came desk calculators, which have been in wide use for nearly fifty years. The improvements in production, and the growing demand for government reports, required further improvements in office mechanization. It was the mechanization of the office that attracted women into that phase of business.

A series of payroll deductions resulting from the social changes caused by the two world wars and the growth of union membership, made payroll calculations a mathematical drudgery without calculators. As expanded businesses demanded closer executive controls, office details increased. Mechanization of office work improved and expanded until the improvements of office routine have been the subject for magazine articles of general public appeal.

We are just beginning to add electronic controls to our larger mechanized offices. The development of this phase of office operations has made it possible for big business to become more easily controlled. Meanwhile, the sales of office equipment have grown enormously. A recession will probably lead to a further increase in the use of office machines and to lower operating costs for office work. White-collar jobs have increased faster than any other type of employment — from something like 25,000 in 1870, to about 7,500,000 in 1948. The pressure for office mechanization has been even greater than the demand for office workers.

The purpose of office machines is to save space, time, costs and effort, and to improve the quality of the work. The changes in quality of work are clear to anyone who has used both the hand and machine methods in many phases of office work. Microfilming has reduced to a small fraction the space formerly required for storing records. The electric typewriter has reduced the fatigue of the typist, increased her output, and saved the time and eyesight of the persons who have to read carbon copies. Dictating machines have saved time for secretaries to devote to other work. Bookkeeping machines have reduced errors, saved operator time and energy, and reduced the floor space required for that operation. The punch-card system has been adapted to an untold number of uses.

The Prudential Insurance Company estimates that office machines have saved it at least ten million dollars a year. The federal government's social security operation, in Baltimore, is the world's largest accounting job. With over ninety-two million accounts, it would function in confusion without adequate office machines. The card-punching machine, card sorter, tabulator and collator make it possible to process nearly a million accounts every day.

This brief survey may suggest that office machines are for large concerns only, but such is not the case. Many machine timesavers are marketed for small business. They are less complex, and therefore require more manual operation. But they are much cheaper, and serve adequately the purposes of small business.[6]

An article in *Business Week* has this to say about the "Machines of Tomorrow":

> The office machines in general use today — and especially the punch card calculators — are in a sense mechanical brains. Given the right information

---

[6] Well-known companies specializing in office machines include the McBee Company, International Business Machines, Underwood, Monroe Calculating Machine Co., Remington Rand, Marchand Calculating Machine Company, National Cash Register Co., Felt & Tarrant Mfg. Co., Pitney-Bowes, Inc., Burroughs Adding Machine Co., A. B. Dick & Co., and the Dictaphone Corporation.

> to start with, they can make selections and comparisons, use judgment, figure out problems, give the right answers. They can do this with such skill and speed that they make the human mind seem clumsy. Yet these machines are nothing compared with what is in the works. The office brains of tomorrow will work thousands of times faster and more smoothly than those of today.[7]

New and better machines are being made possible by developments in the field of electronics. Electronics will account for the mechanical office brain of tomorrow. It is to be hoped that such a brain will not embarrass the executive by reporting on his spelling.

Conclusions

There are those who believe that the original human antagonism to change will hold the techniques of office management to slow, studied improvements. There are just as many who feel that the next decade will firmly establish the revolution of office machines and management. The first need for office management is better planning and controls. Our present machines are doing a fair job with the office's repetitive operations. The next office need is for improved organization and procedures, suggesting development by consulting specialists. The improvements that management consultants and industrial engineers have made in the plant can be duplicated in the office. We need more specialists in office work, and fewer of the type who land there because they do not like the noise and dirt of production.

It seems likely that the present trend toward centralization in office management will continue, and that an increasing share of the paper work will be taken over by electronic impulses, especially in large concerns. At the same time, it is predicted by their manufacturers that the new office machines will be developed to a point, and at a price, where they can be used economically even in the smaller offices.

QUESTIONS

1. What functions would you combine with office management in a small concern?
2. By what three measures does the executive judge the efficiency of office work?
3. What is the essential factor by which the effectiveness of office filing systems is judged?
4. For what purposes are computations used in office work?
5. Why must the office manager necessarily be diplomatic with others than his own staff?
6. Why has office management been relatively neglected until recent years?

---

[7] "Revolutionizing the Office," *Business Week,* No. 1030 (May 28, 1949), pp. 71–72.

7. How would you organize the general offices of a large insurance company with five divisional offices and a number of branch offices under each division?
8. Would you permit the general or departmental office to maintain its own purchasing and personnel functions? Give the reasons for your decisions.
9. Do you favor a stenographic pool under the supervision of the general office? If so, would you make any exceptions on the upper-management levels? On what basic factors would you arrive at your decisions?
10. What are some of the advantages of office decentralization?
11. Can you name two general principles most often neglected in office management?
12. How does the office system synchronize its operations with the other departments?
13. On what criteria should office procedures be judged?
14. Comment on the paper-work situation found in many large offices. How would you establish techniques for its improvement and control?
15. What types of general control would you set up for appraising and correcting office procedures?
16. What reasons do office managers offer for their failure to place more emphasis on the simplification of office procedures? How would you plan for office simplification, and what are some of the specific problems you would attack?
17. Where would you locate the general office of a department store? Would your decision be different for a large industrial plant?
18. How would you plan for an effective office layout?

CASE PROBLEM

UNITED DISTRIBUTORS, INC.

The general office manager of United Distributors, Inc., buyers for a chain of department stores in New England, has been severely criticized for some time by several of the buying departments of the company. The tenor of the complaints concerns his lack of cooperation in getting out the office work in proper shape and on time. It is also alleged that either his filing system is inadequate or he allows his staff to be dilatory in supplying requested correspondence, contracts, catalogues, specifications and other papers to the buying departments.

United Distributors is owned and operated by a group of forty stores to serve as a centralized purchasing unit. Its operations are divided into thirty departments, each specializing in buying a classified group of merchandise. It is housed in a combination office building and warehouse for samples, in a large industrial city. Its vendors are fairly well scattered throughout the country. Because there are definite buying seasons for most of the commodities on United's lists, "rush" periods follow one another in fairly rapid succession. The activity of these periods is intensified by the fact that the companies served by United, in their desire to keep inventory investment down, tend to place their orders at the last minute and then expect immediate delivery.

The office manager has called attention to this general rush atmosphere in defending himself before his critics. As a countercharge, he suggests that if the chiefs of United's thirty buying departments really wanted smoother operations, they would urge the department store members of the buying syndicate to make up their requirements several months in advance, so that the general office could improve its service, and not be put under constant pressure.

The general office has seventy-five employees, all engaged in typical office services. It maintains a stenographic pool and centralized filing for all buying departments. In assigning stenographers to buying executives, it makes an effort to send the same girl to each buyer whenever possible. The files are set up on a commodity basis, with a cross-reference index to help locate requested items.

The rush atmosphere has made for poor morale among the employees, most of whom are women. There is a more or less constant feeling among a complaining minority that they are given unfair workloads, and that the manager favors those who appear to be doing a superior job because of less strenuous assignments. The turnover of office workers has been about 15 per cent, with most complaints coming from the newer employees.

The executive vice-president suggested a year ago that the manager should write an office manual to be used in training new employees, who are now compelled to learn on the job by observation. Work assignments are made by four of the older women as requests reach the office. No attempt is made to group the types of assignments, nor have any work standards been established. The manager contends that the constant pressure of rush requests has made it impossible for him to find time to prepare a manual, which he agrees might help the situation. His counter-proposal is that he be given two men to assist him in managing the office. He further contends that the girls are underpaid in comparison with other office workers in the city, and that management should install an incentive-pay plan so that he "can recommend selected jobs for higher salaries."

The office manager has been with the company ever since it started operations, about twenty-five years ago. He was first a clerk right out of high school, when there were five employees in the general office. Chiefly because he was the oldest of the five male employees in point of service, he was promoted to office manager two years ago, after serving in various clerical capacities for twenty-three years.

The general office is located in the center of the large second floor, with private buying offices lined around the outside walls. The personal facilities for the employees are excellent except for the lighting, which is admittedly below par. The office layout, which should be improved, is strictly conditioned by its center-of-the-floor location and supporting posts.

The office manager hires his own help, who are given the usual morning and afternoon rest periods, and two weeks vacation with pay.

PROBLEM. If you were employed by United Distributors to survey their general office operations, how would you proceed in gathering the detailed information on which to base your recommendations? With the information already available from the statement of this case, what recommendations would you suggest to improve operations and morale in this central office?

CHAPTER 32

Appraising a Department

The measurement and appraisal of most departments, however much these departments may differ in operating details, follow a general pattern. The purpose of a survey is to study the situation as it exists and make suggestions for improvements. Every survey must evaluate the internal organization and operations of a department almost as if it were an independently functioning unit; but at the same time the department must be appraised in terms of how effectively it contributes to the functioning of the larger organization of which it is only a part. Furthermore, to be effective, the survey must give individual attention to both organization and operations. It must answer the two questions: how efficient are the individual operations and how suitable is the organizational setting in which the operations are being performed?

Why survey?

1. *To Improve Operations.* The question might well be asked: why attempt to measure a department if its chief is competent and making a serious effort to do a good job? Any diagnosis aims at making improvements in operations. Experience with departmental surveys has shown that competent operators usually welcome the opportunity to have their activities evaluated against objective standards.

The good manager or supervisor is always surveying his job, seeking for improvements. If he is a real leader, he knows that his function is to see that his subordinates accomplish, in the most efficient manner, the purposes for which his department was established. It makes little difference to him whether the suggestions for improvements are the result of his own observation or come from one of his subordinates or some outside observer. If the suggestion will improve operations, he welcomes it. The incompetent chief, on the other hand, feels that he alone is qualified to evaluate the effectiveness of operations under his jurisdiction, and he resents the assumption that an outsider can make any real contribution to his management of operations. The competent manager is perpetually on the lookout; the incompetent is always on the defensive.

2. *For Executive Control.* In the second place, the departmental survey should establish standards for executive control. This phase aids top executives both to check and to measure the department and its chief. Under proper controls, department activities are measured realistically rather than by guess or rumor. Sneak suggestions by back-stabbing peers within and without the department are minimized to the extent that the top executive has accurate and inclusive controls. Controls serve both the department chief and his superior. They provide the latter with means of detection and appraisal, and they serve to assure the department chief that appraisals of his job, as well as orders affecting his policies, are based on established standards rather than the sudden inspiration of the top executive.

3. *To Define Relations with other Departments.* In the third place, a good survey should expose the relations of the department under investigation to all the other activities of the concern. The observer should be on the lookout for certain recurrent sources of interdepartmental conflict. The following examples are typical:

Production and Sales. Production wants Sales to press for the sale of commodities that Production can make to best advantage.

Production and Purchasing. Production contends that it alone is the best judge of what commodities to buy for its own use.

Production and Personnel. Production is sure it can do a better job of hiring for its activities than Personnel is able to do.

Sales and Purchasing. Sales insists that the customers know more than Purchasing about the types of materials and components that should be used for making company products.

Sales and Personnel. Sales contends that it can do a better selection job among potential salesmen because of the special psychological factors involved.

Purchasing and Engineering. Purchasing insists that it is just as capable as Engineering in criticizing specifications and feels that Engineering is often too exacting to the detriment of costs.

Purchasing and most departments. Most departments feel that Purchasing makes preposterous claims about its buying ability, and believes that those who use the commodities know better about quality, service and price.

Finance and Research. Finance wants Research to set a financial limit to its expenditures for each research project, which Research contends is impossible in most cases.

Research and Production. Research resents the minor problems which Production asks it to solve, as an interference with its more important research programs.

Central Stores, Traffic and Inventory Control. All three contend that Purchasing is trying to absorb them, if it has not already done so, for its own "empire-building," but to the disadvantage of the organization as a whole.

Before business activities became highly functionalized, management's problem was producing enough to satisfy the demand for its products. But fully automatic machines promise to produce a situation, and that relatively soon, where distribution rather than production will be management's chronic headache. The new competitive demand for lower costs compels both a scientific operation of all management functions and a closer knit interrelation among them. Controls furnish the tools for improving these interrelationships, and departmental surveys supply most of the background for fashioning those tools.

Measuring the service activities

Some departments, such as personnel, purchasing, and accounting, perform service functions, which are relatively difficult operations to measure. The two preliminary questions in measuring service activities are: what types of measurement are available and which ones shall be used?

A survey shows what is happening at the time it is made, with respect to both organization and operation. It first depicts *things as they are.* Then, with analysis and synthesis, it should form the basis for setting up a plan for *things as they should be.* But until it is possible to determine how good activities can be, we have only a relative standard. Frankly, we are still at the stage of determining standards for service functions such as procurement and personnel on the basis of "before-and-after" operations of the better managed departments. Furthermore, such techniques as simplification, methods improvement, time studies, layout and flow of work are not so easily applied for the betterment of service departments as they are to the more tangible nonservice activities. In procurement, for example, we have the problem of measuring the service of intangibles in a field of unsettled boundaries. This does not mean, however, that the capable purchasing agent cannot make improvements as a day-to-day proposition.

One measurement of a service department is the degree of acceptance it enjoys from the other departments which it serves. Another measure is the degree of rising or falling expenditures of the service department being surveyed. Although indicative of general acceptance and cost trends, such findings are not so accurate as the measurement of the production department, for example.

At the same time, it is possible to recommend, as the result of survey observations, the contraction or expansion of a service department's activities. The relative lack of standards in such a situation makes it necessary to compare the cost and value of services after the suggested change has been made. In many of the more concrete situations, these cost and value factors can be determined with relative exactness prior to the suggested change. In other words, the measurement of service departments cannot be determined so scientifically as the nonservice activities.

Measuring the organization

Now let us consider the question of departmental organization. We do have general standards for organization and they apply to departments as well as to over-all management. To measure the probable effectiveness of a department's organization, we should find answers to the following questions:

1. Is the type of organization fitted to the department's job? Is it clear, for example, that the operating setup has specific applications for the type of work assigned to the department? It is obvious that scattered plants require a different organization from that of a single operation. Furthermore, the organizational structure must sometimes be planned for a situation where a single raw material such as tobacco, wood pulp, or cotton fiber represents a large proportion of the total purchases. The relative importance of any function should be reflected in the general organizational pattern. It might report to the production manager or the controller. If it is recognized as more important, it might be managed directly by a vice-president.

2. Is the functional division within the department on a sound basis? This query not only includes assignments of specific jobs, but also an examination of the flow of work within and among such jobs. The flow of work should be first examined in the department's office if it has one. There, an acceptable flow provides for a natural sequence of jobs, arranged in desk-to-desk or office-to-office order. It avoids crisscrossing of assignments and paper work. The approach to the department's other activities starts with a floor plan and flow-chart analysis of the job as it is being done. Subsequent studies lead to suggestions for improvement. Actual practice in this part of a survey has produced some amazing results in savings of time and space, as well as reduction in errors.

3. Is there a proper ratio of superiors to subordinates? We often hear the situation humorously expressed as "too many Chiefs and not enough Indians." It is not only unnecessarily expensive to support a faulty ratio in this matter, but it is bad for employee morale. There is nothing more pathetic than a chief with an insufficient workload, unless it is a chief who is not conscious of his lack of work. If the chief's job includes planning, that is a different matter. There are situations where a man staring into a blank corner for hours is really producing in a big way. But such a man must be either planning or analyzing ideas or situations.

4. Are company and departmental objectives clearly defined? And have responsibility and authority been plainly set forth and properly delegated? Company and departmental objectives, as well as the degrees of delegated responsibility and authority should be made clear in the departmental manual. The manual should also provide for communication of company and departmental policies to all personnel concerned. If the department is so small that it can be operated by two or three persons, the manual may not be necessary. But the larger departments cannot operate successfully unless the manual provides answers to the questions noted above. Without written guides to action, individuals of the group may often be working at cross-purposes or in opposition to general company policies. With such

instructions, the chief's time is saved from attention to repetitive details of operation.

5. Are decisions being made at the lowest competent level of supervision? This has to do with the delegation of authority to subordinates. It is the chief operating technique of the "exception principle," which provides that the top manager in any group shall be free to consider only the unusual problems, leaving routine matters to be decided lower down the line. The point emphasized here is that such matters should be delegated down the line just as far as competent decision is available.

6. Are programs and schedules planned in relation to the budget? Because of the importance of the budget as a guide to action for subordinates, and a control device for chiefs, departmental programs and schedules should be planned with the budget estimates in mind. If the department's expense budget was reasonably estimated, it should be adhered to within reason. That does not mean that the year's expenses should exactly meet the budget's estimates.

7. Is the flow of work organized for maximum efficiency? It is practically impossible to answer this question without making a flow chart for the department. The flow chart pictures in static form the department's dynamic activities. Study of the chart's "things-as-they-are" suggests possible improvements. The specialists look for savings in time and space. Savings may be accomplished by combining, eliminating, or changing sequences, to mention a few of the possibilities.

8. Are workers employed at their highest skills? It is not difficult to recognize the low worker morale which results from poor placement, either above or below acquired skills. Wise management puts the unusually dull on dull jobs, and there are such jobs in industry. For a worker to do his best, he must be relatively happy on the job. That means that his job must represent a challenge suitable to his ability.

9. Are all available controls installed and working? This is a difficult question to answer. In the first place, it assumes knowledge of available controls, which will differ among departments, by size, nature of the problems involved, and other factors. When controls are available, and used, the manager knows what is happening and where he is headed. And what is almost as important, when the worker knows that effective controls are installed, and being used, the headaches of management are considerably reduced.

The measurement of activities

There are two primary problems which must be considered before starting to measure the department's activities. One is the measures to be used, and the other is by whom should the measurements be made.

The following items are subject to measurement, but with the warning that some of the answers, even when correct, are of doubtful value in appraising the department's over-all effectiveness.

Personnel. How is the morale of the workers? Their attitude toward their work is a reflection, to some degree, of the chief's competence. Most followers actually enjoy working for a good leader. He is accepted when they respect his knowledge of the job and his ability to lead them. He must be sure of himself and, at the same time, show that he is always eager for suggestions from his subordinates. He must know how to pick capable workers to start with, and then be adept at coordinating their efforts on the job. In other words, he must know how to develop teamwork.

Are departmental employees competent? To what extent are the records of their experience on past jobs supported by their performance on the present job? Has provision been made for training them to do a better job, and to do a job requiring higher skills? Does the department have a merit-rating program so that employees know where they stand? Are the merit-rating reports shown to the workers, and their deficiencies discussed with supervisors? Does the department have a clearly defined compensation policy? Does the policy include incentives for superior performance and future job improvement?

Methods. Does the department have standard operating procedures? Are they clearly communicated to the workers? Are the methods kept up to date by such tests as necessity, simplification, and proper sequence? Are simplified forms used to make operations speedy, accurate and effective?

Budget. How do the department's budgetary estimates compare with its expenditures? If the estimates are too high, has the department strained itself toward the end of the budgetary period to expend all the money allotted to it? If the estimates are too low, where does the fault lie? It is difficult to decide whether the underestimated expense budget or the comes-out-to-the-penny variety is worse. The first indicates inadequate budgetary planning, while the second suggests adherence to the letter but not the spirit of the budgetary principle.

Standard Costs. Standard costs are predetermined so that they may be compared to actual or current costs, to see whether or not costs are "out of control." Cost standards are predetermined on the basis of facts, including experience and controlled experiment. The experiment must use direct and indirect materials that are best suited for the purpose they are serving; include motion and time studies to fix direct labor costs; and an analysis of machines and equipment so that the time element may be reduced to a reasonably low standard.

Establishment of a standard cost requires control over purchasing, inventories and material handling during the entire operation. These controls must be maintained as planned in all experiments made to establish the standard cost under consideration.

Two other important factors are used in fixing standard costs. One is indirect labor, which is customarily figured as a percentage of direct labor costs. This percentage is fixed for various activities or operations on the basis of experience. Occasionally, the ratio is applied uniformly throughout the business. The other factor is the overhead ratio which may apply to a department, a production center, or to the entire business. The ratio may be a percentage of direct labor costs, direct labor and material costs, or the total cost of the operation. In any case, this factor of standard cost is added just before the desired profit item.

Occasionally, standard unit costs are dependent on so many variables as to be only relatively useful. In such cases, empirical costs must play an important role in determining standard costs. Actual costs are known from adequate records, and are not available until all details have been recorded. Only then can the total of actual costs be compared to the predetermined standard, to decide whether or not the activity is "under control" from a cost standpoint.

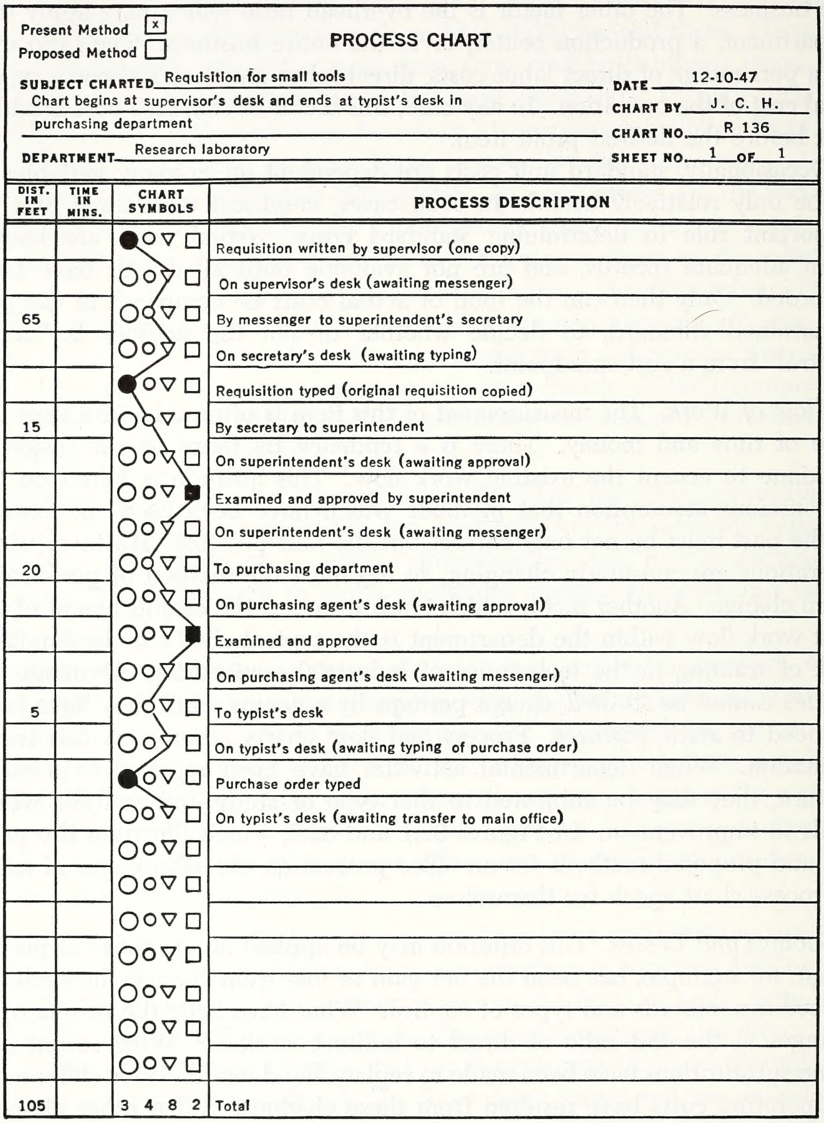
Flow of Work. The measurement of this item is often a fruitful expenditure of time and money. There is a tendency by those on the inside to continue to accept the existing work flow. This attitude is based on the unconscious assumption that methods which have been used successfully in the past must be not only correct but the best possible. However, since operations are constantly changing, so too must the method of performing them change. Another factor which tends to retard the establishment of the best work flow within the department is the typical chief's understandable lack of training in the techniques of industrial engineering. Dynamic activities cannot be studied, except perhaps by a genius, until they have been reduced to static pictures. Process and flow charts accomplish this transformation. When departmental activities have been reduced to a static picture, they may be subjected to that type of study and analysis which leads to improvement. In Figures 32.1 and 32.2, which illustrate the present and proposed methods for an office procedure, the advantages of using a process chart speak for themselves.

Savings and Losses. This criterion may be applied at a number of points. What, for example, has been the net gain or loss from changes in methods, procedures, records and types of control? What have been the results from changes in the cost ratio of direct to indirect workers? What recent machine substitutions have been made to replace hand work? What differences in operating costs have resulted from these changes? What other changes can be made to advantage? Some of these items can be accurately measured, and they naturally reflect the chief's managing ability. Trends can be forecast either by quasi-scientific methods or by hunch. Neither is infallible, but hunches have been found to be the less dependable.

What is the loss in dollars, as well as the intangible loss, due to errors and delays? To what extent does the lack of standard specifications in the production department contribute to such losses? How many discounts are lost because of lack of coordination among the operating departments?

FIGURE 32.1

Process Chart of the Present Method of an Office Operation



Present Method ☒
Proposed Method ☐

PROCESS CHART

SUBJECT CHARTED Requisition for small tools
Chart begins at supervisor's desk and ends at typist's desk in purchasing department

DEPARTMENT Research laboratory

DATE 12-10-47
CHART BY J. C. H.
CHART NO. R 136
SHEET NO. 1 OF 1

DIST. IN FEET	TIME IN MINS.	CHART SYMBOLS	PROCESS DESCRIPTION
		● ○ ▽ ☐	Requisition written by supervisor (one copy)
		◯ ○ ▽ ☐	On supervisor's desk (awaiting messenger)
65		◯ ○ ▽ ☐	By messenger to superintendent's secretary
		◯ ○ ▽ ☐	On secretary's desk (awaiting typing)
		● ○ ▽ ☐	Requisition typed (original requisition copied)
15		◯ ○ ▽ ☐	By secretary to superintendent
		◯ ○ ▽ ☐	On superintendent's desk (awaiting approval)
		◯ ○ ▽ ■	Examined and approved by superintendent
		◯ ○ ▽ ☐	On superintendent's desk (awaiting messenger)
20		◯ ○ ▽ ☐	To purchasing department
		◯ ○ ▽ ☐	On purchasing agent's desk (awaiting approval)
		◯ ○ ▽ ■	Examined and approved
		◯ ○ ▽ ☐	On purchasing agent's desk (awaiting messenger)
5		◯ ○ ▽ ☐	To typist's desk
		◯ ○ ▽ ☐	On typist's desk (awaiting typing of purchase order)
		● ○ ▽ ☐	Purchase order typed
		◯ ○ ▽ ☐	On typist's desk (awaiting transfer to main office)
		◯ ○ ▽ ☐	
		◯ ○ ▽ ☐	
		◯ ○ ▽ ☐	
		◯ ○ ▽ ☐	
		◯ ○ ▽ ☐	
		◯ ○ ▽ ☐	
		◯ ○ ▽ ☐	
105		3 4 8 2	Total

Reprinted from Ralph M. Barnes, *Motion and Time Study* (New York: John Wiley & Sons, Inc., 1953) with permission of author and publisher

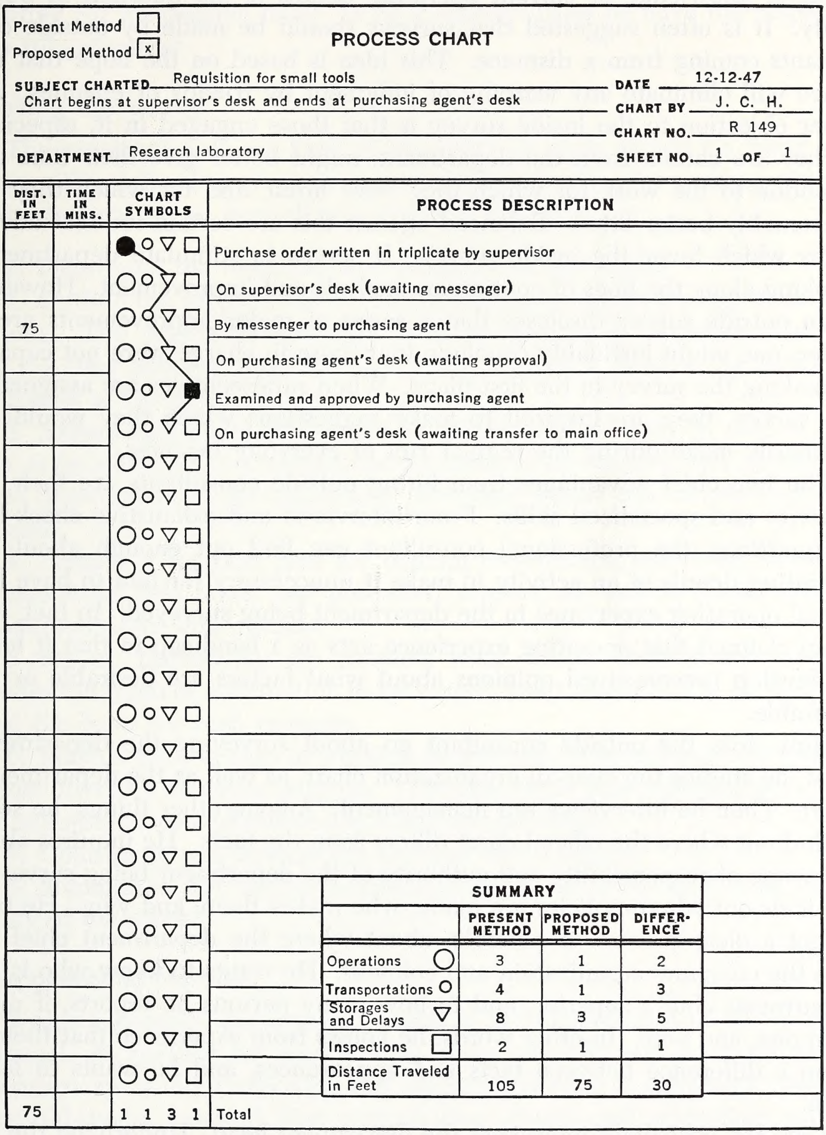
What about the savings from the sale of scrap and obsolete machines and materials?

Who should make the survey?

By whom should the evaluation be made? The departmental survey

FIGURE 32.2

Process Chart of an Improved Method for the Same Office Operation



Present Method ☐
Proposed Method ☒

PROCESS CHART

SUBJECT CHARTED Requisition for small tools
Chart begins at supervisor's desk and ends at purchasing agent's desk
DEPARTMENT Research laboratory

DATE 12-12-47
CHART BY J. C. H.
CHART NO. R 149
SHEET NO. 1 OF 1

DIST. IN FEET	TIME IN MINS.	CHART SYMBOLS	PROCESS DESCRIPTION
		● ○ ▽ ☐	Purchase order written in triplicate by supervisor
		○ ○ ▽ ☐	On supervisor's desk (awaiting messenger)
75		○ ○ ▽ ☐	By messenger to purchasing agent
		○ ○ ▽ ☐	On purchasing agent's desk (awaiting approval)
		○ ○ ▽ ■	Examined and approved by purchasing agent
		○ ○ ▽ ☐	On purchasing agent's desk (awaiting transfer to main office)
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
		○ ○ ▽ ☐	
75		1 1 3 1	Total

SUMMARY

	PRESENT METHOD	PROPOSED METHOD	DIFFERENCE
Operations ○	3	1	2
Transportations ○	4	1	3
Storages and Delays ▽	8	3	5
Inspections ☐	2	1	1
Distance Traveled in Feet	105	75	30

Reprinted from Ralph M. Barnes, *Motion and Time Study* (New York: John Wiley & Sons, Inc., 1953) with permission of author and publisher

may be an outside or an inside job. The inside survey is made by the department's chief or some other officer of the company, such as the controller. The outside survey is made by some management consulting firm. What are the advantages and the disadvantages of the two plans?

Those on the inside naturally know more about the department's activities than anyone brought in from the outside. Outsiders cannot do a good survey job without cooperation from the insiders. But balanced against this superior knowledge of current operating details is the question of objectivity. It is often suggested that surveys should be made by outside consultants coming from a distance. This idea is based on the hope that distance will eliminate any warping of judgment by friends or enemies. Another objection to the inside survey is that those engaged in it, especially if they are chosen from the department, might better give their time and attention to the work for which they were hired, and for which they are presumably better fitted. Balanced against this are certain indirect advantages which favor the inside survey. It serves to stimulate departmental thinking along the lines of continuous analysis and improvement. However, if an outside survey discloses that a series of major improvements are in order, one might justifiably conclude that those in charge were not capable of making the survey in the first place. When subexecutives are assigned to the survey, they are inspired to make suggestions which they would not ordinarily make during the regular run of everyday business.

The two chief advantages from hiring outside consultants are their objectivity and specialized skills. From interviews and exhaustive check-lists of questions, the professional consultant can find out enough about the operating details of an activity to make it unnecessary for him to have had actual operating experience in the department being surveyed. In fact, it is often claimed that operating experience acts as a handicap in that it tends to develop preconceived opinions about what factors are desirable or undesirable.

How does the outside consultant go about surveying the department? First, he studies the over-all organization chart, as well as the departmental chart. Then he interviews top management. Among other things, he seeks to find out where the official chart differs from the facts. He inquires about the scope of responsibility and authority of the department being surveyed. He finds out where policies are made, who makes them, and why. He tries to get a clear picture, if possible, about where the department chief fits into the company organization and councils. He wants to know who is the department chief's superior, and to how many persons he reports, if more than one, and why. In other words, he knows from experience that there is often a difference between facts and appearances, and he wants to learn both.

Then the consultant interviews the department head. Underlying the entire survey is the desire to make his department a better operating unit. Does the chief know his job, and what is his background of training and experience? The successful manager of one type of activity is usually successful in other lines. Learning the facts about an activity is not difficult for a trained mind; but the management of any activity is quite a different thing.

Does the chief know how to delegate jobs? Ability to delegate is an almost instinctive matter, and one that is difficult for some men to learn. It is important because it determines the time the chief will have for planning and organizing his work. Does he want to grow, or is he obviously waiting for his pension date? Is he a leader? Does he have the respect of his subordinates?

Making the survey

The prosecution of any kind of operation or study should be based on a plan. The following steps comprise a general plan for making either a departmental or an over-all management survey:

1. Determine the objective and purposes of the study.
2. Outline the scope of the survey, particularly with reference to its limitations. The degree of thoroughness to be applied is determined, in part, by the time allowed, the funds available, and other factors, including the purposes of the study.
3. Assign staff members to various details of the survey in such a manner as to assure a tie-in among the activities to be studied, and provide for that distribution of the examining personnel which will obtain maximum results.
4. Prepare a uniform plan for making memoranda, including those obtained from field notes and published sources, as well as those obtained from interviews with officials.
5. Set up instructions for contacts with outside individuals. This includes the types of information to be sought, from whom it is to be obtained, and the basis for such requests.
6. Make a general plan of working procedures so as to insure coordinated effort toward a common purpose. This plan saves time, minimizes working at cross-purposes and eliminates many nonessentials.
7. Coordinate and arrange the findings into a report.
8. Summarize the recommendations, which must be supported in the body of the report.

The operating manual

Every successful department, unless it is very small, has an operating manual. By spelling out what is to be done, and who is to do it, the department's work is more effective, and employee morale is enhanced. Some of the old-timers contend that organization charts and operating manuals minimize flexibility. They are correct, but without these management tools, flexibility loses its meaning. Unbridled flexibility means that no one but the top executive knows the rules, and he can change them at his pleasure. Furthermore, the lack of manuals leaves a great void when the chief executive dies or quits. Absence of a manual or organization chart is usually a sure sign of a poorly managed department, but its presence does not necessarily indicate the reverse.

The next question, assuming that the manual exists, is how good is it? Does it tell what it should? Does it include enough of the required answers, and are they based on the best practices? Is it kept up to date? Is it communicated to everyone who should be guided by it?

Records, reports, controls

Records, reports and controls are all indexes of how well or poorly the flow of work is proceeding. The department chief's superior cannot possibly keep his finger on the department pulse unless he receives regular reports based on adequate records. This statement is even more true for the head of the department himself. Reports furnish the basis for supervisory control devices. Then the question arises as to the adequacy of the department's records, as well as the sufficiency and the timing of its reports. Records should form the basis for comprehensive reporting, but at the same time they should not be excessive for the purpose required of them. In any event, they should not duplicate or overlap. These faults are just as often found in reports as they are in the system of records.

Controls should be so devised that they furnish the background for measuring departmental activities by both the department chief and his superior. They should be designed in the first place by the head of the department and subjected to real scrutiny and revision by his superior, who is finally responsible. Outside technical criticism can be of considerable help. Fashioning controls and adapting them to reports is no easy job. This part of the department's work requires the highest type of managerial skill.

What are some of the activities that can be subjected to control in the purchasing department, for example? In general, they include such items as the number of orders placed, the number of invoices passed, the total dollar value of invoices and the average cost of issuing a purchase order, records of cash discounts, and the percentage of small orders. Records of the percentage of rush and overdue orders are important for control purposes because they measure how successfully operations are being timed. The number of changes in the time of issuing purchase orders and bid requests are some indication of the department's alertness to market conditions, and its ability to adjust to them.

Purchasing records should furnish other items for control purposes. Are they set up so that they show whether the proper prices were paid? Do they show the situation with respect to deliveries? Do they furnish information in proper form for exercising inventory control as it relates to forward buying and dead stocks? Do they show administrative expenses, storage and warehouse costs, and the details of waste disposition?

Many departments make no reports at all, and many others compile reports that are unsatisfactory for control purposes. Many department heads are loath to make reports which they believe will not be read by their superiors. Unfortunately, many superiors do neglect reports coming up from below. But even when this is the case, the very process of investigating the situation and formulating the reports furnishes valuable guidance for those who do the job.

Policies

Any good survey will measure the adequacy of department policies and find out how well they are integrated with over-all company policies. Conflicts between department and company policies should be eliminated. This observation may seem trite, but the fact is that conflicts are the rule rather than the exception. The cause is usually found in the making of departmental policies too far down the management line. Such policy formulation might be satisfactory if the results were later scrutinized carefully by top management, for eliminations, corrections and additions. It has been assumed too often that a department chief is capable of making his own policy manual and that it will automatically dovetail with company policies. This has not been true in practice.

Company policies guide the interrelations among management, employees, customers and the public. Both over-all and operating policies are bound to touch each of these groups. The tenor of all policies should be to maximize the company's interests with all four groups. This is a difficult task because natural conflicts exist among the four categories. Here is one field where the objective specialist can make valid suggestions. He is more likely to see the forest as well as the trees.

It must also be emphasized that policies are not static. They should change with the conditions which they serve. Successful management is dynamic, and it must adjust to changed situations in all of its relationships. Policy changes are just as necessary as product changes if the profits are to be maintained.

Attitude appraisal

Finally, there is the attitude appraisal. No matter how well any particular job is being performed according to the accepted techniques and methods, it will be judged ultimately by the non-experts. What do the other departments think of the one being surveyed? And what, for example, do vendors think of the department? Possibly some outside opinions may be unfair, but little can be done about correcting unfair opinions until the criticisms are known. With the facts at hand, there is a starting point for correcting errors and changing opinions, if they are based on misunderstandings.

Conclusions

In conclusion, no activity of any kind can be improved unless the facts are known. We are still more or less at sea until we can compare with accepted standards those generalizations which are obtained from the facts. The chief who seeks appraisal of his department always practices self-appraisal of his activities. When possible, he also seeks the objective appraisal of others, especially of those whose training and experience enable them to make their judgments on a scientific basis. When the department chief does not welcome an activity survey, it is not unfair to assume either that he fears such close scrutiny of his work or that he has become convinced that his management is a complete success. Both attitudes are dangerous. Fear feeds on itself and eventually leads to disaster. And, as someone has shrewdly observed, "The head turned by success is face to face with failure."

QUESTIONS

1. What conclusion would you draw about the operator who resists a survey of his department?
2. How can the departmental survey develop measurements for top-management control?
3. In what ways can an objective appraisal improve operations?
4. Why is it more difficult to appraise a service department than a line operation?
5. What are some of the criteria you would use in appraising the effectiveness of a departmental organization?
6. How would you measure the relation between Chiefs and Indians for the purpose of correcting over- or under-organization?
7. What plans would you devise for assuring adequate communication of departmental and company objectives and policies among the employees of a single department?
8. How would you develop measurements for operations or services for which generally accepted standards are lacking?
9. What criteria would you use for appraising the personnel activity?
10. To what extent does adherence to the department's budget-expense estimates indicate the competence of its chief? How would you feel about the department which came out even with its estimates?
11. How would you establish a reasonable departmental ratio between direct and indirect labor costs?
12. How can the flow chart be used to measure the management of a department, and improve its effectiveness?
13. Should the departmental appraisal be made by an outside person or agency? Support your decision, and suggest any other plan which you feel would be superior.
14. If you were called in as an outside consultant to make a department survey, how would you proceed with it?
15. What effect does the manual have on department operations?
16. To what extent would you examine department records and reports, in making an appraisal, and why?
17. Who should determine departmental policies?
18. Does the attitude or morale of department employees have any relation to its effectiveness? What about the attitude of outsiders toward the department?

CASE PROBLEM

STANDARD PUMPS

Standard Pumps grew steadily with the industrial West Coast over a period of sixty years. Lack of serious competition in its early days made for profits, a surplus and a degree of management satisfaction that carried the concern with comparative ease until a decade ago. Its general line of pumps for the oil industry, mining and farms were already well established with the trade when the third generation of the closely held corporation was starting to get hold of the business.

When volume and net profits began a downward trend, the board of directors decided to build a branch plant in the Middle West, to specialize in the manufacture of pumps for gas stations. It was felt that the necessary labor for a small assembly operation would be readily available in that section of the country, where several aggressive gas pump concerns were located, and metering components manufactured.

Because the new setup was largely on an assembly basis with few highly skilled mechanics, one of the "old-school" and less cooperative executives was selected to operate the new plant. The home office did not expect operating results to be outstanding the first year, but by the middle of the second year both costs and volume were so far from the planned target that the directors decided to find out why.

A former operating friend of the branch plant manager was sent to make a general survey of the branch plant situation, with its 150 employees. It was felt that the two old friends would cooperate in pooling their experience to find out the cause of the trouble and suggest the remedies. It was also believed that since the branch was almost entirely an assembly operation, relieved of major office and accounting problems, purchasing and sales, the survey job would not entail more time or knowledge than the two men could give it. The appraisal would be made easier because the branch manager had recently employed a second assistant.

The following are some of the facts that the "inside" unprofessional survey disclosed:

1. The two assistants to the plant manager were ranked as co-foremen with equal responsibility and authority.
2. There were two unions in the plant. The 25 skilled tool-makers belonged to a trade union, while the 125 semiskilled and unskilled workers were members of an industrial union. Because of this situation, many of the tool-makers often had chips on their shoulders. Their helpers and the assembly operators were constantly registering grievances through their union stewards.
3. The entire operation was housed in one large room, where the co-foremen directed the work force as a whole.
4. The employment record showed a labor turnover of 25 per cent for the first 18 months of operation.
5. Jealousy was already developing between the two co-foremen, who complained about each other to the general manager.

6. The more recently employed co-foreman appeared to have the confidence of the majority of the workers.
7. The general manager stated that he had not prepared an operating manual because he believed in maximum flexibility for superior results, and the appraiser from the home office agreed with him.
8. Although the home office dispatched a time-study engineer to the branch shortly after it was in operation, no time standards were in use. There was no apparent conflict between the time-study engineer and the general manager on this point.
9. The manager continued operations on a straight-time wage basis, "to secure a quality product."
10. Reports to the home office by the plant manager were sporadic, and omitted some of the information asked for on the prepared forms which were supplied to him.
11. The final report, signed by the joint appraisers, concluded that the operations were progressing as well as could be expected under the circumstances, and that the admitted weaknesses would be ironed out as operations continued.

PROBLEM. The home-office management is not satisfied with the report. In fact, the general feeling is that the situation is worse than was suspected. It was finally decided to engage an outside consultant to go over the situation and report recommendations. If you were hired for that purpose, what recommendations would you suggest from the facts as already described? What, in your opinion, are some of the undisclosed background reasons for the present situation at the branch plant?

CHAPTER 33

Research and Development

Research and development have many objectives. One is the development of new products and the improvement of those already in use. Another is the discovery and improvement of materials, the finding of substitutes for restricted materials or those in short supply, and the development of new uses for materials and products in short demand. A large field of research relates to machines, tools and equipment of all kinds. Relatively undeveloped is research for the improvement of techniques, methods and policies for management's various activities such as personnel, production, labor relations, finance, sales and purchasing.

Research is a scientific investigation of the known for the purpose of discovering the unknown. Charles F. Kettering, former vice-president of General Motors in charge of research, says that we need research to point out our present shortcomings and ways to overcome them and to add to our present store of fundamental knowledge for use in future developments. *Development is the improvement of existing things, ideas and methods.* It is frequently difficult to separate research and development. The latter is often called research, probably because it sounds loftier. Both are important and each lends impetus to the other.[1]

There are two fundamental types of research — pure and applied. *Pure research,* also called basic and intensive, is the quest for new discoveries and new factual knowledge which it is hoped will lead to new principles or techniques. *Applied research,* also called extensive, is the application of established scientific principles and knowledge to the solution of specific problems. Here again the division is not clear cut because applied research occasionally leads to discoveries which become part of the body of pure scientific knowledge. Pure research is pursued for its own sake, but often leads to practical discoveries not contemplated at the outset. Applied research has a definite problem solution for its goal. DuPont's discovery of the nylon polymer is an example of pure research, whereas the development of the fiber from nylon is an example of applied research.

---

[1] Air Force Regulation No. 80–4 (March 1, 1949) refers to research as "studies and experimentation to insure timely improvements in concepts, techniques, and materiel for personnel utilization, training, management, planning, operations, intelligence, engineering development, production, supply, and maintenance, by application of the best scientific knowledge, personnel, and facilities to specific problems and promising fields." Although military verbiage seems to have lost its laconic quality in this instance, the definition appears to fit what we are here calling "development," rather than "research."

Fields of industrial research

Industrial and business research can be divided roughly into two fields — technical and nontechnical. The technical field is largely devoted to products, materials, mechanical equipment and technical methods. The nontechnical field covers the economic and social conditions affecting business, and the many phases of management where research may lead to improved productivity, lower costs, increased sales and the improvement of labor–management relations. A brief list of business research purposes, without regard to their technical or nontechnical characteristics, would be:

1. To reduce the cost of production, sales and distribution
2. To develop new products, materials, methods and machines
3. To improve materials and develop substitutes
4. To increase the uses of existing products
5. To improve management techniques in all activities
6. To develop improved methods for coordination and control
7. To improve administration and public relations policies

In order to survive, individual businesses must make a profit in one or more competitive fields. The pace is set by those concerns which keep in the forefront with products and services at prices the public will pay. In recent years the pace-setters have been those firms which have realized the value of research. What are some of the management phases of business and industry that can be corrected through research?

1. *Unsatisfactory products* put on the market while still in the experimental stage lead to expensive upkeep and unsatisfactory service for consumers. There are mechanical products so designed that they require magicians to repair them. Products for which parts are difficult to obtain are also unsatisfactory.

2. *Unsatisfactory service,* especially in the retail trade, leads to decreased sales and profits. When a department store sells red porch chairs and delivers green on Friday instead of Wednesday, as promised, with an error in billing against the customer's interest, it needs quality control, and the nature of its failing can best be isolated by research.

3. *Selling prices too high* to meet competition or customer finances are invariably found among the non-users of research. Rising material and labor costs can frequently be offset by improved management, machines and technical methods.

4. *Pre-recession planning* is often neglected or poorly done because the economic facts are lacking or their significance is not appreciated. The con-

sequent inability to plan for "suspected" recessions is obvious. It is not unusual for many firms to step up employment of workers and foremen before recessions, thus wasting the expense of training, and intensifying the subsequent shock of unemployment. Along the same line, faster executive promotions lead to later increased layoffs. Worst of all is the "rule-of-thumb" plant expansion, with its increased operation and management expenses. Unreasonable enlargement of physical facilities is one of the causes for the enforced transfer of ownership to more competent management when a business recession occurs. Any contemplated expansion should be tempered by scientific research, which offers an opportunity to minimize shocks by analysis of social and economic factors.

5. *Waste of materials* can be reduced through research. The development and use of powdered metals for making small parts by pressure and heat (sintering) practically eliminates the waste that occurs from the machining method, besides doing a faster and cheaper job. This process was developed through research, and is still being refined by it. Much avoidable waste results from the use of materials of unnecessarily high quality.

6. *Waste of manpower* by poorly scheduled production is often caused by the failure to study markets and to employ some of the tested means for better leveling of demand. Research can minimize a lot of the temporary employment, and unemployment, by companies which accept the "inevitable" as long as it produces a reasonable profit. The rational stabilization of industrial employment must develop on the company level through research. It cannot be accomplished by government fiat.

7. *New products that do not sell* could be avoided if large-scale production of them was begun only after receiving favorable findings from scientific market and product research, already a well-established technique. This procedure would prevent losses to the concern and to society. The Bureau of Foreign and Domestic Commerce of the Department of Commerce has issued a check-list on the "Introduction of New Industrial Products" containing the following items: [2]

1. The market
2. Buying habits of the market
3. Firm's relation to the market
4. Competition
5. Seller's price policy
6. Channels of distribution
7. Sales promotion
8. Management of sales force
9. Sources of ideas for new industrial products
10. Major purpose for which new industrial products will be made
11. Design and engineering factors
12. Production factors
13. Materials factors

---

[2] Market Research Series No. 6, 1937.

14. Service factors
15. New capital investment factors
16. Relation of new products to regular plans

Under each of these topics about seven questions are asked, leading to answers that will help in coming to a rational conclusion. In addition to the factors noted above, there are other pertinent queries listed in a category entitled "Other Questions." This bulletin is highly recommended to anyone desiring a scientific approach to the problem of determining whether or not a new product should be undertaken.

8. *Public relations can be improved* through appropriate research techniques. One such technique is the attitude survey. Questionnaires administered to a sample of the general public are always likely to produce unanticipated criticisms of company methods, products or services which can easily be corrected. Research on the types and content of company advertising can determine how effective the advertising program is. The objectivity which is fostered by the use of research methods will help, more than any opinions of top management, to separate the company's false and uninteresting publicity from the true and the pertinent.

It must not be forgotten that employees are a part of the public, and anything that builds the workers' loyalty to the company enhances the company's prestige in the community at the same time. Specifically, when employees feel that they work for a good company, this feeling is bound to filter into the community, and improve the personnel department's opportunities for recruitment. Secondly, a favorable employee attitude toward company products or services is bound to be reflected in the attitudes of that part of the general public with whom the employees come in contact, since the outsiders may reasonably assume that the company's own workers know what they are talking about.

Growth of research

Prior to 1900 industrial research was practically unknown. By 1920 there were 297 companies with research laboratories; by 1940 we had 2,264 industrial research laboratories; and in 1950 we had more than 3000. The 1952 U. S. Bureau of Labor Statistics' nation-wide survey of our industrial research facilities reports that:

> The national outlay for scientific research and development totaled more than three and one-half billion dollars in 1952, over four times the yearly expenditure at the beginning of World War II. Two-thirds of this tremendous sum was for work performed in laboratories and other facilities owned by private industry.[3]

Other facts brought out by the report are these:

1. The federal government financed half the 1951 research costs, amounting to about $2 billion.

---

[3] U. S. Bureau of Labor Statistics, and the Research and Development Board of the Department of Defense, *Industrial Research and Development* (1953), p. 1.

2. Research and development work is mainly concentrated in a small number of large companies.
3. More than half the research scientists are working in three fields — electrical, aircraft and chemical.
4. The average cost per research scientist was $22,100 in 1951.

In testifying (1950) before the federal Celler Committee, which was investigating the relation between big business and monopoly, the president of the DuPont Company stated that without its concentration of money and talent, his company could not have developed synthetics like nylon and cellophane. In spite of this apparently justifiable stand, there is a feeling in many quarters that research will not make its maximum contribution to industry and the public welfare until some of it can be done by small concerns. This feeling is based on the assumption that large-scale industrial research will lead the way in most new developments to the detriment of the smaller concerns, whose limited capacity compels them to follow. It is probably true that certain types of technological problem will remain in the realm of "big" research, but there will always be some fields in which individuals and small concerns can operate profitably. At the same time, it is obvious that a small concern courts disaster when it uses a disproportionate amount of its resources for research, particularly pure research.

Research agencies

Most industrial research today is being done by private industry, the federal government, universities and private laboratories. The amount of either pure or applied research carried on outside these four agencies is a very small fraction of the total. Current domination of research — especially pure research — by strong financial interests indicates that the independent researcher's opportunities are decidedly limited.

While research by private industry is growing fast, *government research* and government contributions to research agencies are growing even faster. It was pointed out above that the total expenditures for research in this country during 1952 amounted to $3½ billion. Of this amount, industry contributed 44 per cent, and the federal government the balance, or 56 per cent. The largest expenditure was for aircraft, which used 12.7 per cent of the total. The next three were electrical machines (6.4 per cent), instruments and controls (6.4 per cent) and photographic research (4.8 per cent).[4]

Because pure research has an over-all social benefit, it seems proper that large research funds for that field should come from the public treasury. In addition, financial restrictions prevent even large concerns from some types of pure research. Whether it is a virtue or not, most of the government's funds are spent, directly or indirectly, on instruments of destruction. If the enormity of their power saves this nation from paralysis in the first instance,

[4] National Industrial Conference Board, *Road Maps of Industry,* No. 919 (August 7, 1953).

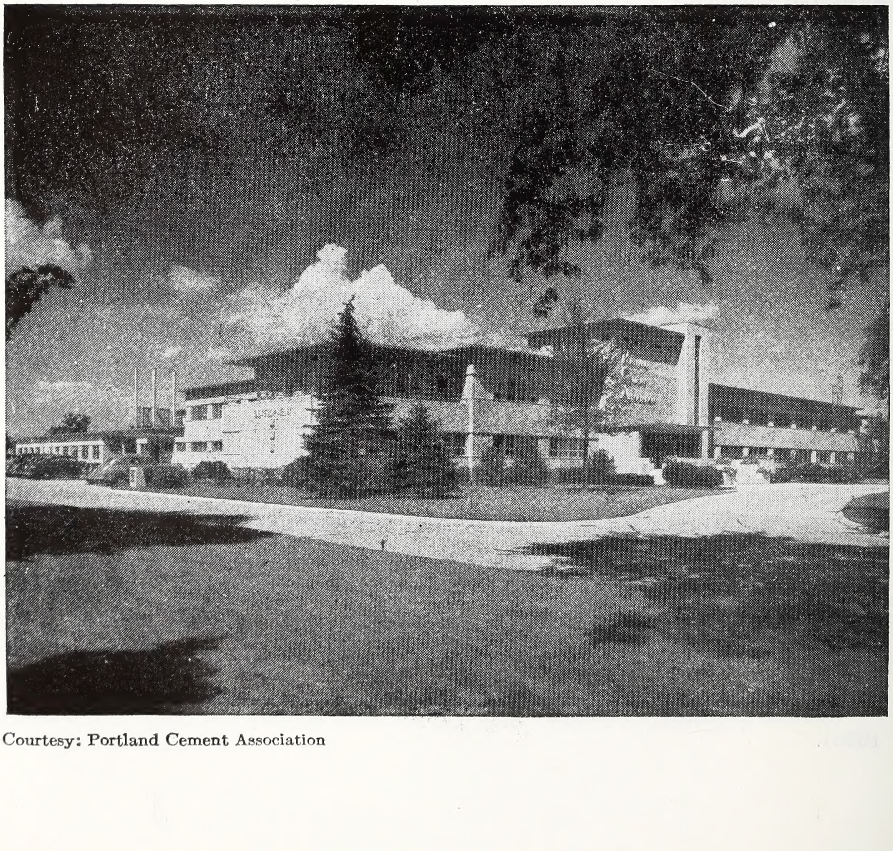
and eventually raises our standard of living, the program will have been justified.

Industry is not always pleased with the amount and types of government research. Fear of competition is, of course, the basis for this attitude. Since about 70 per cent of the government's research funds are spent for defense, industry's competitive position is not precarious. However, government competition does plague industry's ability to employ research scientists. Also, the government can buy equipment that industry cannot afford. Although its pay scale is lower than industry's, it offers more security and fringe benefits, and what is more to the point with idealistic young scientists, it offers many more opportunities in the field of pure research.

In spite of the government challenge, *industrial research* is not lagging in its development. Figure 33.1 is the new research building of the Portland Cement Association, which houses thirty separate laboratories. In 1950, some twenty industries contributed to a total investment of over seven million dollars for the establishment of quarters for three research institutes at the University of Chicago.

FIGURE 33.1

New Research Laboratory



Courtesy: Portland Cement Association

The arguments used to obtain these contributions are interesting. In the first place, it was easy to demonstrate that the success of many of our largest companies grew out of research, carried on while the companies were still very small, in some cases. In the second place, it was pointed out that several European countries were far ahead of us in fundamental research. In fifty years, 20 Nobel Prizes came to the United States in physics, chemistry and medicine, while 119 went to Europe, of which 36 were for German scientists. It was also pointed out that during the last war four of the outstanding research developments were "foreign born"—atomic fission in Germany, penicillin and radar in England, and blood banks in the Soviet Union.

General Motors, DuPont, Dow Chemical, General Electric and Eastman Kodak are representative of our largest industrial researchers. At the same time, they are among the best of the stable profit earners. While industrial research was growing tenfold between 1920 and 1940, these concerns were far exceeding the national average.

University research has been growing steadily during the past twenty-five years. Originally small laboratories dealing mostly with pure research, they have been increasingly subsidized by business associations, such as the Leather Research Institute at the University of Cincinnati. Another factor contributing to the growth of university research is the practice of accepting contracts from industry and government agencies, with twofold benefits: the universities have been able to increase the knowledge of their scientists, while the purchasers of their wares have been assured the highest type of research ability at reasonable costs. In the neglected field of management research, the University of Pennsylvania has recently dedicated the Frederick Winslow Taylor Management Laboratory. In such a research center, business has an opportunity to cooperate in working out new management techniques which have been comparatively neglected for what is thought to be more profitable technical research.

There are numerous *private research* laboratories, usually nonprofit organizations with considerable funds at their disposal. Some operate nationally on a contractual basis, while others specialize on industry or regional problems. An example of the regional bureau is the Southern Research Institute, with headquarters in Birmingham, Alabama, sponsored by some of the country's largest industries. The SRI has about one hundred technicians working in twelve fields.

The cost of research

Research is expensive, especially pure research where profitable results are unpredictable. Those business leaders who refuse to appropriate large sums for research base their decision on its "gamble" nature. The question is, when do research appropriations cease to become reasonably conservative? Many detailed questions must be answered before a decision makes any sense. Besides, the decision may well be different for various companies and fields of inquiry. The question of expense is a relative one, suggesting that the real question is, "Will it pay dividends?"

It must be remembered, too, that research failures do not always mean losses; negative results sometimes have value. As Charles F. Kettering has said: "Tell me the reason why something cannot be done and you have been helpful in narrowing my field of attack." That is to say, a research project may have to be abandoned because some one problem proves to be — for the time being, at least — insurmountable. Nevertheless, the project is not a complete waste, for once the *cause* of failure has been isolated, future researchers in the area will know on what specific element in the problem they must concentrate their efforts.

Since it is not possible to eliminate uncertainty from research work, it should be kept under control. The costs should be kept consistent with the value of the solution sought. Even when the main purpose has not been achieved, the work already done occasionally accomplishes some unanticipated purpose of value. The first requisite of research control is the establishment of cost estimates by project. If the time and cost estimates are fair, then lack of results after the estimated time and money have been spent suggests frank discussion of the value of going further. The research record at the time of discussion, together with the opinions of the researchers, must be weighed by those with a subjective interest; to stop or go on is largely a management decision.[5]

Some companies do not know the true cost of their research programs. Failures may develop because operating departments are allowed to call on the research agency for answers to their production problems. The real cost of such research diversions is seldom known. Certainly no company should undertake a program beyond its current financial ability on the theory that it is a sure profit bet for the near future.

Research and taxes

The tax laws occasionally slow research progress because of the different tax treatment of capital expenditures and expense items. Expense can be deducted during the tax year, while tax deductions for capital outlays must be spread over the life of the item concerned. Research projects are frequently considered capital outlays for tax purposes unless the taxpayer's research department has been long established. Because some research reaches no profitable conclusion, and other types are intangible, it is often difficult, if not impossible, to capitalize research projects properly even when they are not chargeable to expense.

These complications between taxes and research, and the uncertainty of the latter, occasionally lead business men to postpone the establishment of a laboratory or the pursuit of contemplated research projects. Business and industry want the cost of most research treated as an expense for tax purposes.

---

[5] The Policy Holders' Service Bureau of the Metropolitan Life Insurance Company has made a study of research control by seventy-five business concerns. It points out that control must start with projects rather than the over-all research program, and that careful attention must be given to the relation of costs and benefits.

The value of research

One of the country's outstanding security analysts wrote: "Study the names of those stocks known as market leaders and you'll probably have a list of corporations that engage in extensive research." There is no doubt that the advances in industrial technology are reflected in stock-exchange quotations. In the long pull, where large sums are required for a balanced program of pure and applied research, the records show that industrial research pays sizable dividends. In addition, considerable social benefits result from many of these programs. As they add new products and develop older products, they create jobs, increase wages, and reduce selling prices for many items that affect our living standards.

Since the opening of DuPont's research laboratory in 1902, the value of the company's stock increased 1080 per cent by 1952. A part of this success was due to the DuPont policy toward research. Lammot DuPont is credited with telling the company research director in the deep depression year of 1932: "It is more important to carry out research than it is to pay dividends." The relation between research values and depressed business is little recognized by many agencies that should know better. It is customary to reduce research funds and activities drastically during a recession, and practically eliminate them during a depression. Obviously, that is the time when the research of today should be preparing for the markets of tomorrow. When the gas station attendant was asked whether he thought it would stop raining, he replied that "it always has." Business might well be guided by this philosophy during dips in the business cycles.

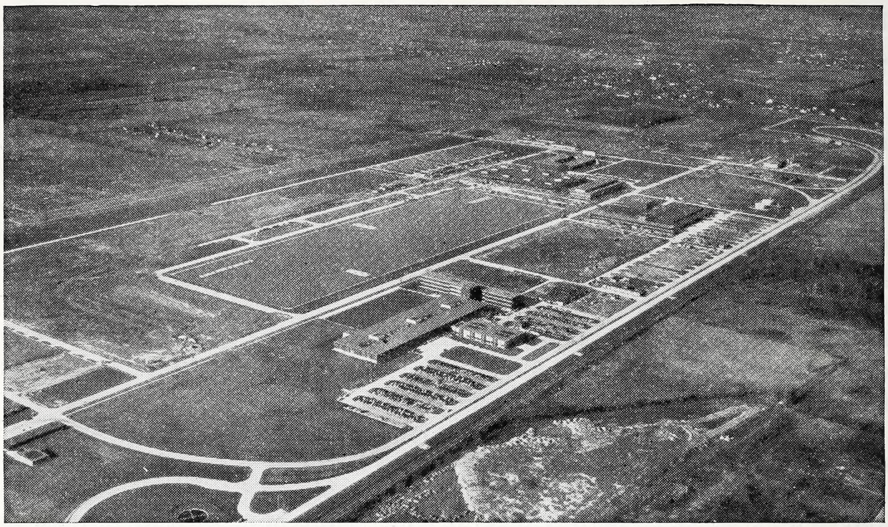
The purpose of military research is primarily preparing to defeat the enemy in the next war. With this in mind, it seems unbelievable that weapon research has reached its lowest ebb between wars, with the deep cuts following right behind the peace. Research scientists are not in heavy demand again until the prospect, or even the opening guns, of the next war. This policy insures the defects of emergency research, and the repeated "modification" of weapons while they are in full-scale production, thus delaying and confusing delivery to the armed forces.

Eastman Kodak Company was built on research after it was well established in the film and camera business. As the result of research, Eastman Kodak has added such highly profitable lines as rayon yarn, vitamin concentrates, lenses, dyes, drugs, plastics, and over three thousand chemical items. In 1940 it was spending 25 per cent of its earnings on research. In the preceding decade, while employment fell nationally by 9 per cent, it was rising by 75 per cent with Eastman.[6]

[6] A share of Eastman Kodak which sold for $100 in 1901 was worth about $2250 in 1950. This increase in capital value was accompanied by highly satisfactory dividends.

FIGURE 33.2

General Motors Research Center



Courtesy: General Motors Corporation

Quotations from executives of two other companies illustrate the possibilities of the dollar value of research. One writes: "We can figure that our leading profits are from 100 per cent to 200 per cent of the amount spent for research." The other: "For every dollar spent in true research, we have reduced costs and increased net revenue by at least $100." On the relation between research and invested capital values, Standard & Poor's Security Agency suggests that "the research program of a company is usually a sound guide to the investment value of its securities, and the money spent on research is one of the best forms of insurance on invested capital." [7]

Research organization

Research is frequently a function of the engineering division but just as often it is organized as a separate activity with its director reporting to someone in top management. Another common characteristic of the research setup is an advisory committee consisting of such interested members of management as the heads of engineering, finance, production and sales.

Besides lending its aid to the director of research in management procedures, the committee frequently fixes research policies, within the purview of general company policies. Research policies are concerned with the selection of projects, budget quotas, criteria for determining whether a project should be abandoned, and these policies may possibly set financial and other standards for research personnel and facilities.

---

[7] These quotations, and some other items in this paragraph, were taken from an analysis by Standard & Poor's Security Agency, issued in 1950, and entitled "Industrial Research in Certain Companies is Paving the Way for Higher Stock Prices."

The degree to which the committee advises depends on the circumstances in individual companies. Its power may be restricted, or its approval may be required even before a research project is begun. In any case, its advice is probably welcomed on the question of whether to pursue a project past its original budget allowance. Committee decisions dilute the responsibility of the director of research in matters of high policy and low predictability. In addition, the committee system fosters the cooperative attitudes of other departments toward research.

It is customary in many organizations to break down research into its various fields. Some companies even allow research to be done by some of the operating departments concerned. For example, marketing research may be a function of marketing or sales, and production research may be assigned to engineering. As a general rule, there will be better cooperation among the various branches of research if they are centralized. Cooperation is important if it can lead to better studies and more dependable conclusions. In some fields the coordination of company research is necessary, and in addition offers opportunities to reduce costs. If the purpose of industrial research is to reduce operating costs, centralization of responsibility will produce better results.

Management research

Research for improving the methods of management is relatively neglected even by companies which hold research techniques in high esteem. Too many capable executives feel that they were born that way. This delusion often leads to undue self-satisfaction, especially when profits are showing reasonable vitality. The prevalence of this attitude among corporate management, particularly below the top level, has served to minimize management research — on executives.

Good executive judgment, like good research, is reflected in decisions made after an objective analysis of all the facts. The high-salaried executive who makes intuitive decisions is often only high-priced, and caricatures of his type are not entirely without justification. Since he feels that there is no place for research in his private bailiwick, he is often in the position of denying to both investors and consumers the advantages that a research program could bring.

What is the cause of this defensive attitude? In part it is due to a lack of training in the principles of management. Executives do not always appreciate the fact that current tested principles were once unknown theories, brought to light by analysis and trial — which means by research. Lack of familiarity with the causes of management problems is likely to forestall the best plans for solving them. Failure to consider all aspects of a management problem before making a decision is working by hunch rather than by that degree of scientific analysis which the problem deserves.

The development of controls is one fertile field for business research. Controls can neither be developed nor put into effect until known standards are available for use in exercising them. The development of control standards for the various phases of business and industrial management would furnish a much needed scientific foundation for dependable managing. If functional standards were available, many prospective concerns would remain in that category instead of being washed out later through legal process. The manager who justifies the size of his salary by reference to company profits during a war boom, and rejustifies it after peace by pointing to the unexpectedly small size of the losses, eventually becomes interested in some of the answers which management research proposes.

Research and war

During World War II, articles in the magazines and Sunday supplements telling of the wonderful postwar offerings of scientific research helped to create the widely accepted myth that war was in some way justified by the stimulation it gave to research and the predicted postwar rise in living standards. It cannot be denied that both world wars have witnessed a vast mobilization of research talent, and that this research, organized and financed by national governments, resulted in important discoveries, both practical and theoretical, which have redounded ultimately to the benefit of society at large. For example, in order to reconnoiter and bomb enemy territory, significant advances in aircraft design and construction were made in both wars, advances which revolutionized commercial transportation in peacetime. Again, in the effort to create a bigger and more deadly bomb, the atom was split in World War II to usher in an age of atomic energy for peaceful purposes.

But even though it is a matter of historical fact that the by-products of war have contributed to the well-being of societies at peace, it is not therefore legitimate to argue that war is a good thing for research. The great technological advances of wartime were made possible only through large government expenditures to mobilize available research talent and to permit the concentration of many minds on a few all-important problems. The same money and talent could be mobilized just as effectively in peacetime. One might reply that it has taken the stimulus of a major war to organize research on this vast scale, and to the extent that this objection is valid, it is an unfortunate commentary on the arrangements which our society, at peace, makes for the organizing and financing of research. Nevertheless, as was pointed out above, our national government is investing more and more money in basic research. Had there not been a war, it is quite possible that nuclear fission would not have been developed as soon as it was. At the same time, if the government were freed from the threat of war, it is just as possible that funds which went to pay for the superbombs would have been available for large-scale research in such areas as the causes and prevention of cancer, polio, and heart disease — areas in which research today must be supported largely by voluntary contributions from the general public.

Far from being an intrinsic aid to research, war has the effect of stifling many kinds of research that might lead to higher living standards. The high tempo of applied research during a war is possible only because of the scientific theory that has been developed by basic research during the preceding period of peace. When rapid production of war materials becomes the outstanding demand, pure research is bound to suffer. War stifles research not only by dictating what problems will be investigated but also by the blight it casts over scientific manpower. Trained scientists are diverted from their fields of greatest competence, and future scientists, if they are not killed on the battlefield, at best are losing valuable years of training in their chosen fields of specialization. Dr. Raymond B. Fosdick, former president of the Rockefeller Foundation, has said that war's interference with our scientific training "ground up the seed corn of scientific progress in the next generation to make a day's feed for the war machine." Successful war cannot proceed without exacting a high price from research.

Research management

When research reaches the proportions it has in many of our industries and universities, the problem of its management becomes important. Scientists are not necessarily good managers, and good scientists, having a creative bent, do not care to be burdened with managing. New York University has set up a course or curriculum in "Management of Research and Development," including twenty-eight subjects, for which lecturers are drawn mostly from the research departments of large industries. The University's prospectus states the need for and the purpose of the course as follows:

> The rapid growth of industrial research as an "industry," with its ever increasing roster of employees, makes it imperative that individuals be trained for the duties and responsibilities of its administration. There is an increased need for training subordinates and new personnel to carry out the continuing administration duties during the postwar period when research in connection with new processes, products and markets will present a complex problem. The purpose of this course is to train personnel to carry forward to successful completion the managerial problems of the industrial research organization.

Conclusions

Organized research has developed only since 1900. Prior to that time most of the pure and applied research in this country was carried on by persons working independently in their own laboratories. Some of the results were outstanding — as witness the long line of inventions by such men as Edison and Steinmetz. However, the efforts of most of the independent researchers were undoubtedly lost to society because of unorganized and underfinanced plans and sporadic individual efforts. Until the last decade, most of our notable research has been of the applied type. In the field of pure research a number of European countries have led the procession for a long time. Several of our largest industries are now pledged to pure research on a large scale, with encouraging prospects.

The *research attitude* of letting the facts lead to the conclusions is the only foundation for dependable results. Preconceived conclusions have hurt scientific research, even in high places. A professor of one of our leading universities, called to Washington to do research on a problem with some political significance, reports that he was briefed in advance as to the conclusion desired. The correct attitude in management research is to judge objectively and recommend constructively. Fault-finding is not the proper attitude for industrial surveys and research. Besides immediate conclusions, management research contributes established criteria which can be fed back for use in subsequent problems of a similar nature.

Pure research is the feeder for subsequent applied research. Without the former, the latter will be largely sterile. There is a distinct opportunity for an enlargement of the basic research field in this country. It should not rest so predominantly in the hands of the federal government and a few of our giant industries.

Technical inquiry has been the major concern of industrial research. Its more tangible and profitable results have been one of the causes for the lag in management research.

Applied industrial research has two phases — the improvement of products, processes and techniques, and the prevention, by warning against them, of futile management plans, products and techniques.

Small-scale research has been giving way to the heavily endowed private and industrial laboratories, to the possible detriment of the total research purpose. Bigness in research cannot alone guarantee the greatest social benefits, especially with its opportunity to withhold, for financial reasons, some of the best fruits of its efforts. Some plan should be devised for the encouragement of small-scale research in fields fitted to its purposes and resources.

Wartime research should be appraised at its true value rather than be made the subject of human-interest magazine articles. When the situation is seen rationally by those in high government authority, including Congress, we shall avoid repeating the errors in the organization of research which occurred during the last war.

Management research must be established on an organized basis, similar to that of the technically applied variety. The application of organized research will increase the usefulness, reduce the costs, and aid in preventing some of the false starts of those concerns which already find managerial controls difficult.

Government aids to research should be accomplished by easing taxes as well as by direct financial assistance.

Recorded research is imperative in all of its statistical and other details, so that another scientist can take over if necessary; otherwise some of its fruits are lost. Detailed progress records and findings are necessary even for projects which do not have a successful conclusion. Records save time and expense when they can be used in some later research by isolating the problem hurdle which could not be surmounted, and by pointing out which methods have not proved useful in attacking the problem.

The value of research, as measured both by profits and social benefits, has been so well established since 1940 that there is little doubt that research will continue to expand. A future danger for research could develop from its outstanding record of success, which might encourage larger financial outlays than some firms could reasonably afford.

QUESTIONS

1. What is the difference between research and development?
2. How does pure research aid applied research?
3. What important subjects lie within the field of nontechnical research? Why have they been relatively neglected, and what prospects does the immediate future offer?
4. What are some of the management phases of business and industry that can be corrected through research, and what improvements do they require?
5. How can waste of materials be reduced through research? Give an example.
6. How can the salability of products be determined prior to their going into production?
7. What can be done about promoting research by medium-sized concerns? What general fields are open to companies with limited financial resources?
8. To what extent should the government finance research by universities and industry?
9. Why is this country relatively weak in basic research, and how can the deficiency be corrected?
10. What evidence do we have that pure research is profitable to industry?
11. Of what value, if any, are research failures?
12. How far up the management line should a pure research organization report, and why?
13. What controls can be used to keep research in line, and how should they be applied?
14. How does the federal tax system affect the progress of our research? What general changes would you suggest in the system, to stimulate research?
15. Why has the management of research become a problem?

CASE PROBLEM

The Sebring Engineering and Machine Company

The Sebring Engineering and Machine Company manufactures a diversified line of textile and special-purpose machines, and consumer hard goods. It has fifteen scattered plants, some of which specialize on particular products. The company employs about 15,000, of whom some 3000 are skilled mechanics. Its products are distributed nationally, for which it employs an extensive and highly trained sales force.

Sebring's textile machines are sold to the hosiery, underwear, cloth and neckwear trade. Competition is keen in this line because of almost continuous development in processes for styling and increasing machine productivity to cut costs. The concern's engineering department has carried the load for improving textile machines, besides designing special-purpose machines for its industrial customers, and its large line of equipment for the consumer and retailer trade.

To keep abreast, or ahead of its competitors, and to reduce the workload of its engineering department, the company has recently completed a million-dollar Research Center, to which it has attracted a group of about one hundred scientists, research engineers and highly skilled technicians.

The program for the new Center has been compiled from suggestions made by various departments. These include the following:

1. Manufacturing asks that it study technical production processes for assuring uniform quality and reducing unit costs.
2. Sales wants the Research Center to develop new products, and improve the design and workability of current products.
3. Engineering has requested that certain of its more technical problems be assigned to the Center for suggestions which shall be referred back to engineering.
4. Finance submitted a request for the development of a five-year detailed program on income and expenditures, and plans for increasing sales through some device for financing customer purchases without disturbing company credit.
5. Purchasing is interested in an organizational study to determine the extent to which certain allied activities should be "serialized" under its control.
6. Personnel desires a scientific study of its training methods, to evaluate their relative effectiveness, and the possibilities of improving them. It is also interested in some new plans for improving labor–management relations, especially a new wage-incentive program that will increase worker earnings while reducing unit labor costs.
7. Management is interested in having the new Research Center develop standards for all company activities, so that controls can be made tighter and quicker. Its over-all suggestion is for a general organization survey to relieve what it considers laxities resulting from overorganization.

The Board of Control for the new Center is composed of its director, three of his top scientists, and three corporate officers of the company. The corporate officers are pleased with the proposed agenda, but the other four members of the Board of Control are not satisfied. They feel that the management leaders are trying to have all their activity problems solved at a high-speed tempo rather than on a scientific research basis. They are further concerned about the shifting to their shoulders of certain types of details for which the departments appear to be trying to escape thought, planning and responsibility. Because 80 per cent of the research personnel were drawn from outside the company's ranks, the technical and majority members of the Board feel that although they should give weighty consideration to the suggestions submitted, they should first proceed with an over-all study of company organization, operations and needs, and then submit a program to the Board based on their findings.

PROBLEM. Criticize the requests submitted by the departments. How would you set up the Center's program for improving the operations and management of Sebring? What divisions would you establish for operating the new Research Center? How would you determine and distribute its operating budget? Would you plan for any kind of pure research, and if so, what would be its nature?

CHAPTER 34 Public Relations

The importance of public relations to business and industry is well illustrated in a survey by the National Industrial Conference Board which shows that of 89 companies having a planned public relations program, 22 (25 per cent) assigned a full-time executive to its operation.[1] This represents a long step forward during the relatively short transition period since 1900 when there was little even resembling the idea of public relations.

In the past fifty years, public relations has run the gamut from the seriously announced dogma of "the public be damned," through a policy of enlightened selfishness, to the current idea of far-seeing business leaders of telling the truth, the whole truth and nothing but the truth. Communication has become the watchword of public relations. While this internal transition was going on, the "public" was slowly expanding to include employees, stockholders, customers, vendors, the several layers of government, press and radio, and the local community. This drastic increase in the number of groups reached by public relations naturally required adjustments in policy. New programs were needed to guide management in the areas it was entering.

One purpose of public relations is to establish and maintain favorable attitudes by various groups toward an individual business or an association of businesses with similar objectives. Sometimes a city or state will try to create, through public relations techniques, a favorable attitude toward its environment, which it claims is beneficial to industry, vacationers or health-seekers. Some concerns even consider it advisable to hire specialists to promote a favorable public opinion.

Early professional attempts to develop acceptable public relations came mainly from specialists in the fields of journalism and advertising. Their job was to use the media they understood, to combat the attitudes and propaganda of groups and organizations which believed that business was opposed to programs of social betterment. These early attempts to guide public opinion were far from successful, largely because their approach was both negative and narrow. They devoted too much effort to proving that certain allegations were not true. Their emphasis was on cleverly worded announcements and press releases aimed solely at advancing their employers' points of view. As this technique increasingly spread a negative gospel, it eventually earned the label of "propaganda" from a large section of the general public.

---

[1] "Management Looks at Public Relations," National Industrial Conference Board *Business Record,* Vol. 10 (December 1953), pp. 450–453.

The next development in the pursuit of good public relations had a double goal. Management was still interested in having the public understand its objectives and methods, but it was also interested in learning what the public thought and wanted, so that it would have a basis for altering some of its practices. It was this new interest in the public's opinions that caused the expansion of the concept "public" to include the several groups already mentioned.

Public relations today is not a sign-on-the-line sales relationship. It is rather one which develops from company contacts, actions, and policies consistently carried out. Public relations departments give publicity to facts and figures, history, products, and accomplishments of their companies, and stories of general interest about their employees. The modern program has many aspects, most of which are based on some phase of human interest. In a broad sense, industrial public relations has two positive objectives: (1) to interpret the company to the public and (2) to interpret public opinion to company officials. The fewer the facts about a company which the public has at its disposal, the greater are the opportunities for distortion of public opinion about that company. Therefore, the problem of those concerns seeking accurate public opinions is to communicate the truth by word and deed. This policy will naturally include correction of false statements and rumors, but the public-relations program must never consist solely of self-defense and denials of rumors; it must lay the factual groundwork for favorable public opinion so that distorted attitudes have no chance to arise in the first place.

Public Relations Contacts

As has been suggested, the groups reached by "public relations" have come to include all of a concern's outside contacts, and many of those that might be considered purely internal. However, it is practically impossible to classify business contacts as inside or outside because all of them overlap to a large extent. Actually, the ramifications and interrelations of any company's contacts suggest that the term "public relations" no longer describes the situation it purports to represent. It is desirable, therefore, to treat the various groups separately, discussing the nature of their influence and some of the successful methods for guiding their opinions.

Personnel

Originally, there was no idea of trying to influence the opinions of employees, on the theory that since they were paid an agreed wage for their services, there was nothing further to the relationship after the expressed or implied labor contract was complied with. If the worker was dissatisfied, he was free to sell his services elsewhere. Since his opinion of his erstwhile employer was not likely to have any public interest, nothing was gained by trying to influence it one way or the other.

Several things slowly reshaped management philosophy concerning the workers' opinions of the boss and his outfit. First, there was the realization that the employee was also a part of the consuming public. As his wages and standard of living rose, his potential spending power made him even more important as a potential customer. As a member of a consumer cooperative, his buying influence might be greatly increased. Second, there was the growing realization that the worker was paying more attention to the social and economic influences of business and industry.

Of more importance than these two was the increasing inquisitiveness and power of organized labor. It was recognized that some individual employee members of unions could have worth-while influence within large organizations, a force for good or evil as far as the employer was concerned. When the employer and the union compete for divided loyalties on an emotional basis, the employer customarily receives the minority share. The employer's best opportunity for improving the worker's opinion is to earn his loyalty by word and deed rather than try to coax a favorable attitude by emotional appeals.

The keenest recognition of the worker influence was evident during the twenties, in attempts to have employees become stockholders in the concerns for which they worked. One of the reasons for urging the purchase of company stock was to reduce union influence. It was also expected that worker-stockholders would take a greater interest in productivity and speak well of the company to the section of the public with whom they came in contact. For their part, the workers were promised a stockholder's share in the profits from securities often bought below the market price.

We have already recounted the fate of these employee-stockholding plans. When the profits were only a fraction of what the employees had anticipated, or failed to materialize altogether, in the decade following 1930, the worker's attitude toward his employer was worse than before his stock purchase. Stock-ownership plans for employees still exist, but today the pressure to buy has been minimized, and the element of risk is explained. Utility companies still offer securities to their employees, but preferred stocks or bonds have largely replaced the common stock offerings.

Most companies use more plans for creating favorable employee opinion than they use with any other contact. In a nation-wide survey, the executives replying considered management–employee relations the most important phase of their public relations program.[2] It is not surprising, therefore, that there are so many outstanding plans for capturing employee good will. These plans include:

1. Employee attitude surveys
2. Open house for relatives and friends
3. The employee's handbook
4. Prompt handling of grievances
5. The employees' magazine
6. Circulars covering special topics
7. Publicizing of business facts
8. Slide films and motion pictures
9. Question-and-answer meetings with officers
10. Nursery care of workers' children

The *attitude survey*, often made by some outside professional concern, determines the extent of worker satisfaction and dissatisfaction, and the causes for either. Harmful situations which can be remedied by management are frequently uncovered through questionnaires and interviews. The survey techniques have been improved to the point where progressive management uses them periodically to gauge changes in worker opinions. The survey method allows management to deal with justifiable complaints before they have a chance to grow into major grievances. When employees are convinced of the survey's anonymity and objectivity, their participation is surprisingly helpful to the interests of all parties concerned.

The *open house* is fast becoming a favorite means of swelling the pride of employees and their families in the workplace and its products. Before the open house, most wives knew little or nothing about what their husbands actually did at the plant. But when the workers' duties come to life during one of these plant exhibits, shop talk at home takes on more meaning, and the entire family enjoys a new association with the company. A frequent by-product of the open house is the family's realization of the difficulty and importance of the breadwinner's job. In a broad sense, the open house tends to stabilize industrial relations because of the wife's new interest in the work at the plant or office. The most critical questioning about layoffs and strike votes often comes from the "old woman," to whom the answers must make common sense.

One phase of the program which is often overlooked is the opportunity to intersperse placard stories of company economics with the directional open-house signs. As an experienced hand in public relations expresses it:

> Another important function of signs is to stress important economic aspects of management of the plant. The open house is probably the plant's most significant opportunity to give its neighbors factual statements counteracting some of the loose thinking that often leads people to look with disfavor on the private competitive system of enterprise. Signs can point out how much a machine costs; how many shares of stock it represents; the cost of operating

---

[2] *Ibid.*

> a machine, including depreciation; how old the machine is; how much it has meant in the way of wages for its operators and dividends for its owners.[3]

The *employees' handbook* gives detailed information that a new employee wants to know about company facilities, pay days, vacations, and other matters. It should also be used to emphasize all company policies which relate to the workers. Policies are important to new and old workers, and they should be reduced to writing to inspire confidence in management.

The handling of *grievances* is always provided for in the labor–management contract, and is discussed in the chapter on Collective Bargaining. However, handling of grievances has a special significance in connection with public relations, in that they must be handled promptly, in a spirit of sincere interest, rather than because of the contract agreement. They must be handled fairly and objectively, even when the decision is against the company. An acknowledged grievance handled quickly and fairly is a boost for the company in the long run.

In most concerns, the *employee magazine* is the responsibility of one department, usually personnel. It can be an excellent medium for improving employee morale and gaining acceptance of company policies. The magazine should deal mainly with notes and stories about employees. When items are focused on company activities in general, emphasis should be placed on the way in which these activities are of direct concern to the worker. It has been amply demonstrated that the outstanding features compelling reader interest are photographs and stories of employees' children and grandchildren. The advantage of the employee magazine from the public relations standpoint is the opportunity it offers to create a family feeling among a large group whose single common interest is working for the same company.

Circulars covering special topics refer particularly to matters important enough to cause discussion throughout the plant, especially when erroneous information is leading employees to false conclusions. It is better if these explanatory circulars are issued before gossip spreads. For example, it may be rumored that the company has just had a large contract cancelled, or that some improved automatic machinery will cause large layoffs. Both items may be true but the conclusions derived from them may be absolutely false. Ignorance begets suspicion with almost everyone, and though belated facts allay suspicion, facts in advance create confidence.

Publicizing of business facts can be accomplished through circulars or through the kind of placards suggested for open-house exhibits. The economic facts of business in general, and of the worker's employer in particular, should be presented. They should be able to demonstrate the basic fairness of the distribution of the industry's income among the various factors of production.

---

[3] From an excellent exposition of the open house by L. M. Stark, "How to Plan and Run Open House," *Factory Management and Maintenance,* Vol. 107 (February 1949), p. 97.

Slide films and motion pictures can be used to arouse worker interest in the company by showing how the numerous components go into the finished products, and the importance of each department's contribution to the whole. They can also be used to show past social and athletic events, tending to enliven the company-family feeling.

Question-and-answer meetings with company officers will effectively dispel the worker's feeling about his ivory-tower bosses. A meeting presided over by the president is an excellent start in that direction, and when he can unhesitatingly answer questions, employee acceptance of company management is immeasurably furthered.

Customers

Customers, and potential customers from the consuming public, were voted the second most important contact in the survey referred to. Doubtless, this opinion was influenced by the fact that established customers make up a large part of company good-will value. How is that value built and retained? Probably on the principle that the customer is always right — within reason. Whether the customer is right usually depends on his honesty. Many successful companies assume customer honesty. New customers are usually acquired by various kinds of advertising and publicity, some of which can be measured for results. But established customers are held and more new ones are obtained by fair treatment in daily contacts.

When the laundry returns a pair of high-priced sheets with frayed holes after the third washing, and refuses the claim for damages by contending that the manufacturer is at fault — that's poor customer relations. The assumption that the laundry does not carry insurance for such purposes, and desires to escape all such liability, is fairly grounded. If the customer goes further and writes his story to the manufacturer of the sheets, then his complaint is going direct to the source of a wide unknown market. When the manufacturer asks to have the sheet sent back for inspection in his laboratory, the customer feels that there is a real interest, no matter what the outcome. When the manufacturer writes that his laboratory finds no fault with the sheet's construction, but does find evidence of dangerously strong cleansing materials, the customer is lined up still more closely with the producer of the sheets. But when the letter further states that the company is sending two new sheets along with the torn one, the customer will go out of his way to recommend that brand of sheets, and patronize another laundry. Similar examples are multiplied many times in the experience of the average consumer with similar reactions. They illustrate quite simply how to win and lose customers.

The community

The community has frequently been given third place in public relations importance, and has been the subject of most published material. Obviously, however, industrial relations are partly community relations. Many of the constructive programs in use today for improving public relations with the community arose originally as correctives for objectionable practices in the past. There was a time when the owners and managers of industrial concerns were indifferent to the slums in which their workers lived, when they gave little thought to the air and water pollution which the manufacturing processes created, and when they held themselves aloof from local institutions and community programs. This sort of indifference is rapidly disappearing as leaders of business and industry realize that in the long run what is good for the community is also good for business. One expert puts the problem this way:

> My greatest doubts relate to the ability of business to win the friendship and confidence of the community — to develop a large number of executives who are so broad in their interests and so deeply concerned with the problems of the non-business parts of the community that the community is friendly toward business and that the spokesmen of business win a good hearing.[4]

The community, small or medium-sized, is inherently afraid of the absentee power controlling local big business, but that fear can be dispelled by carefully planned programs for improving relations with the community. Action with respect to all of the following items should be considered:

1. Harmonious relations with employees
2. Participation in local government
3. Modern housing programs
4. Positive public health programs
5. Elimination of health problems
6. Street and traffic planning
7. Parks and playgrounds
8. Community educational projects
9. Local civic clubs
10. The community chest

Company executives should become community citizens with more than an average interest in its welfare. The company may hire professionals to guide the community program, but its executives must control it and stand out front in its execution. They must initiate the contacts with press and radio, schools, service clubs and churches. The program should also include well-formulated plans for handling plant visitors and speech-making by company officials.

An example of community welfare was carried out by a rather small concern in the slum area of an eastern city, to the advantage of the neighborhood surrounding its plant and of the city as a whole, while at the same time the concern was furthering its own interests. The company owned a number of slum dwellings contiguous to the plant, bought for the purpose of possible future expansion. The neighborhood was well below par socially. In fact, several of its young men had criminal records. Because the company's policy was to spend nothing on improving its houses, the rent was made unusually low, thus attracting the dregs of the community. Gradually, the houses sank to a level where they became known as the "Bull Pens" by the bookkeeping department.

---

[4] Sumner H. Slichter, "The Problems of Business Leadership in a Laboristic Economy," in Marvin Bower, editor, *The Development of Executive Leadership* (Cambridge: Harvard University Press, 1949), p. 27.

It was decided to make a drastic change to improve the neighborhood and reduce the vandalism that was causing destruction of company property. The board of directors decided to demolish the houses and build a modern playground on the property. Finished, it was a model recreation area for children in the age groups from five to eighteen. When the city administration turned down a request for supervision for the playground, the company furnished it at its own expense.

As a result of this interest in community affairs, the company reduced its juvenile damages to the vanishing point, and obtained considerable favorable publicity for its product locally. Evidence of a new pride among surrounding property owners was seen in the fact that most of them put fresh coats of paint on their houses. Finally, several other enterprises in this factory and warehouse district were inspired to emulate this example.

Stockholders

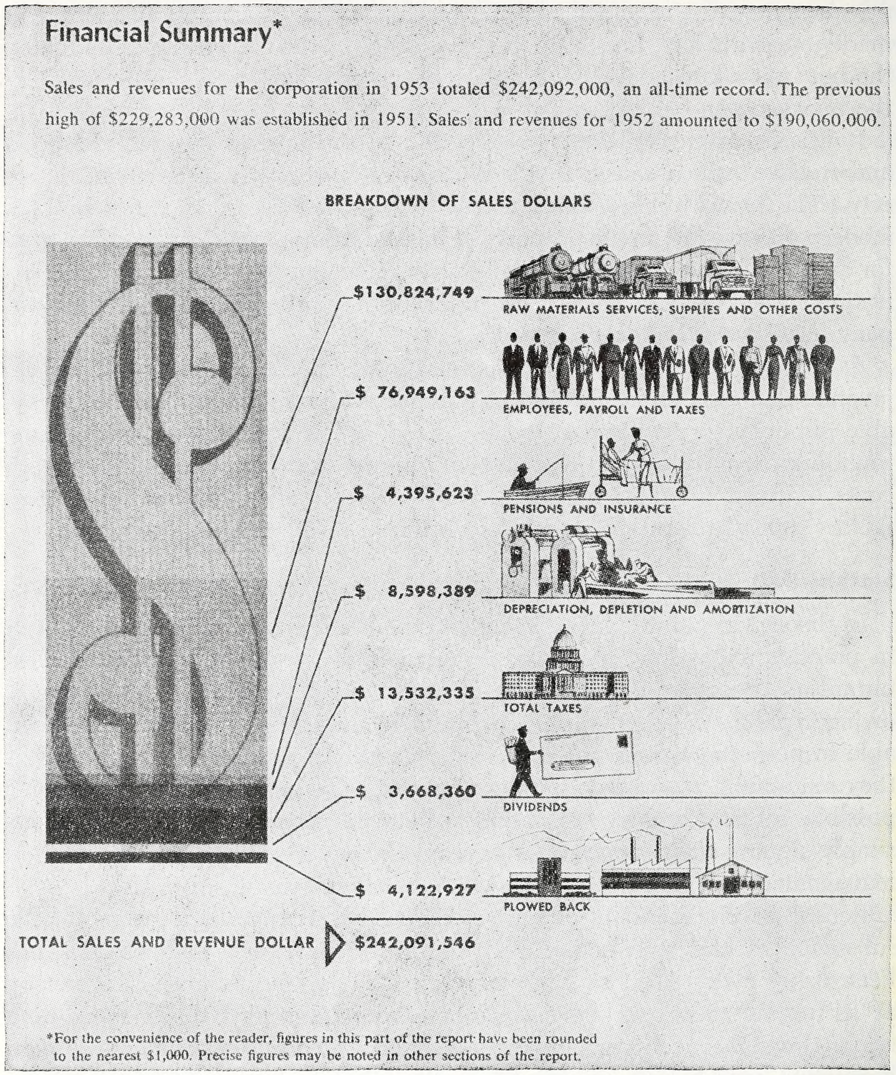
In theory, corporate management is a model of economic democracy, but in practice it has long since degenerated into a form of economic totalitarianism. Because of the failure of stockholders to function as a group, owing in part to their geographical dispersion, directors and officers have been able to perpetuate their unquestioned rule almost indefinitely, especially if they maintain a reasonable dividend record. The corporate proxy makes it possible for stockholders to satisfy whatever responsibility they feel by simply signing their names once a year, making it possible for entrenched management to ignore the real owners between annual meetings.

Recent developments in public relations have been changing some of the substance of the stockholder relationship. Progressive management has been using every effort to have large stockholder representation in person at its annual meetings. Several large corporations have been scheduling regional annual meetings for the convenience of their stockholders. Luncheons have been held in an effort to make relations less perfunctory. Question-and-answer periods have demonstrated that some stockholders know how to ask pertinent questions when they are given an opportunity.

Another innovation has been the readable annual report. In place of an unattractive brochure full of statistics and the annual financial statement, coupled with accounting and legal hocus-pocus, the company's owners are receiving readable and interesting annual reports, often illustrated. The past year's operations are reviewed and prospects for the future set forth. Such former "inside" secrets as officers' salaries and their stock interests are also listed. With many other similar facts available, stockholder groups,

FIGURE 34.1

Page from Modern Report to Stockholders



Financial Summary*

Sales and revenues for the corporation in 1953 totaled $242,092,000, an all-time record. The previous high of $229,283,000 was established in 1951. Sales and revenues for 1952 amounted to $190,060,000.

BREAKDOWN OF SALES DOLLARS

$130,824,749	RAW MATERIALS SERVICES, SUPPLIES AND OTHER COSTS
$ 76,949,163	EMPLOYEES, PAYROLL AND TAXES
$ 4,395,623	PENSIONS AND INSURANCE
$ 8,598,389	DEPRECIATION, DEPLETION AND AMORTIZATION
$ 13,532,335	TOTAL TAXES
$ 3,668,360	DIVIDENDS
$ 4,122,927	PLOWED BACK
TOTAL SALES AND REVENUE DOLLAR	$242,091,546

*For the convenience of the reader, figures in this part of the report have been rounded to the nearest $1,000. Precise figures may be noted in other sections of the report.

Courtesy: Allegheny Ludlum Steel Corp.

or individuals, are frequently able to initiate changes in their own interests. The final opportunity comes with the assignment of proxies to someone other than those proposed by the directors, for the purpose of bringing pressure, or a change of administration, at the annual meeting. Strangely enough, it is the public relations departments of the very companies where leadership has become entrenched through the long-standing disinterest of the stockholders which are now fostering this new stockholder activity and encouraging the real owners to use their primary instrument of control over company activities — the corporate ballot.

Vendors

Only within recent years has the value of good relations with suppliers been recognized. The older policy put the onus on the supplier, a burden which he might relieve unofficially, at least, by periodic presents, especially at Christmas, to the purchasing agent. With the establishment of a give-and take relationship, it became the mutually accepted philosophy that the vendor was giving value received for payments made by the buyer's company, and that the company's interest was best served by having trusted vendors from whom it could expect value received, plus service.

In place of the rather arrogant habit of letting the salesman cool his heels in the waiting room, to obtain a lower price and a subservient attitude, good practice today recognizes that it pays not to keep the salesman waiting, but to treat him with the same courtesies which the company hopes are being extended to its own salesmen. Since some salesmen have behind them the publicity weight of press and radio combined, it is considered good business relations to be on the same side with such power.

Many concerns now go out of their way to supply vendors' representatives with buying manuals so that their time may be conserved and their activities properly directed in knowing whom to see and where he may be found. An excellent idea to improve vendor relations is to have on display, in the waiting room, the products, parts and materials used by the purchaser. It prompts ideas in the salesman's mind, and may lead to profitable suggestions and contacts for the company's buyers.

Press and radio

Some public relations directors are too prone to appraise their value to the company by the amount of free time and space they obtain from the press and radio. This attitude can easily backfire in company relations with these publicity media. One purpose of the press and radio is to dispense news with a public interest, and they often pay to obtain such information. Because they are interested in carrying publicity items only when they have genuine news value, a company does not improve its relations with press and radio by fretting every time its promotional material fails to get a free play in the mass media.

When press and radio releases have a public interest, they are excellent sources for maintaining good public relations. Many times, the press or radio is after details about something which it has learned from other than company sources. Occasionally, company officials are interested in killing the story altogether or at least in omitting some of the details.

To get a fair share of what it wants from press and radio, the company must be prepared to give what the other side requires. When the relationship is established on a basis of mutual confidence, the public news agencies have a good record of sticking to their word.

Government

This phase of public relations is not so difficult as it is precarious. What law applies to a given situation, and what does it mean? What effect may one expect, in maintaining good governmental relations, from the turnover of administrative officers on all government levels?

It is impossible to choose the layer of government that can do the most harm or the most good. The various values of different contacts depend on the nature and size of the concern involved. A small concern with one plant may find close cooperation with the local government authorities most valuable. Without minimizing the importance of local government relations for large companies, it is obvious that most of their important governmental problems and relations exist on the state and national levels. Until administrative law has a more solid basis in this country, relations with governmental agencies must perforce depend to a considerable extent on the attitudes of those who administer the rules and regulations which give effect to laws. This situation makes the management of governmental relations a job requiring skill and experience.

Organization

The organizational setup for handling public relations depends on such factors as the size and nature of the company, whether it sells consumer or producer products, the nature and extent of territory it serves, the capacity of its executives, and the recognizable value of good public relations for long-term success. When profits are considered from the long-run standpoint, they include social as well as economic values.

In small concerns, one person can handle all phases of public relations, thus assuring coordination if not balance in the distribution of attention and fund allotments. Every company, no matter how small, exercises some form of public relations, be it for good or poor results. When one person performs this function on a part-time basis, the results will be commensurate with his general ability and his comprehension of the program as a whole. In either of these cases, public relations is likely to report to the owner, president, or executive vice-president, unless it happens that one of these persons is handling the job. Since the aim of public relations is to influence the opinions of many different groups, the higher the function is placed in the management hierarchy, the more likely is a given amount of effort to achieve the desired results.

In larger concerns, the head of public relations may report to a top executive officer, or to the chief of advertising or industrial relations. In some cases, the function is responsible to a committee of two or more executives.

When this is the procedure, the purpose is to program activities that have stood the test of distinctly different points of view.

Professional Counsel

Since the "human touch" is always an important element in public relations some executives feel that professional programs are too impersonal to get the desired results. In some instances, professionalization of this phase of management has gone so far that the specialists have not even met the company's operating chiefs. This impersonality can also develop within the company just as easily as when outside counsel is employed. One commentator has expressed this idea by noting that

> just as a great musician can sometimes make a scrubby composition sound quite well, so a superlative master of public relations can, no doubt, put the attractive veneer on a policy or program which is not so good as he makes it seem. But the veneer will defy only briefly the proposition that a public relations program can be no better than the basic business and industrial practice with which it deals.[5]

Since public relations contacts of all kinds should reflect the spirit and policy of management, any professionalized program should be controlled critically, and carried on to a large degree by company executives. Only in this way can the spirit of the company be relayed to the public, or an effective coordination and balance of company policies be publicized.

Conclusions

Business and industry have been one of the chief factors in molding and changing our economic and social concepts and daily living habits. There is no doubt that they will play just as important a part in that process in the future. Public relations, as it is dealt with in this chapter, has become an essential activity of business and industry. To the extent that public pressure is increased, management leaders must do an acceptable job in our complicated social and economic environments. They will be judged by their actions, and their actions must demonstrate their good judgment and the sincerity of their expressed social purposes. Their developing social practices of the past few decades give promise that they will fulfill their public obligations.

The effects of public opinion on business profits, and the extent of this influence are aptly expressed by Paul Garrett, vice-president of public relations of General Motors: "The continuing end responsibility of management is and always must be to sell its products *against competition at a net profit.* But who could have envisioned the winding chambers in the *labyrinth of*

---

[5] "Public Relations Can Be Too Specialized," *Business Week,* No. 873 (May 25, 1946), p. 116.

public opinion through which management must successfully pass today to reach a net profit? Public opinion is but the shadow cast by what the company does, and the executive's behavior is largely instrumental in casting that shadow."

QUESTIONS

1. Why would it be advisable for a concern manufacturing producer goods to have a public relations program? If you recommended it, to what group would you suggest that it be directed?
2. What is meant by the negative phase of public relations, and what part, if any, should it play in the program?
3. How would you implement a positive two-way public relations program?
4. To what extent, and how, does organized labor interfere with management's employee relations? What specific plan would you suggest to overcome this interference?
5. What would be your reaction when you learned that the international office of your union local had bought a large block of your company's common stock? What would you do about it?
6. As executive vice-president, would you place enough confidence in a professional attitude survey among your unskilled workers to warrant any action on your part? Give your reasons.
7. What policies would you adopt to assure promotion of good employee relations through the company magazine?
8. If you were president of a concern employing three thousand workers, two-thirds of whom were common laborers, would you hold periodic meetings on company time to communicate future plans of your organization? Would you answer questions from such an audience? Would your opinion be different if there were only two hundred employees? Why?
9. Do you believe in the often-announced management policy that "the customer is always right"? If you were settling a grievance with a retail customer whose complaint seemed to you unjustified, what would you say to the customer?
10. Can you think of any disadvantages that might accrue to public relations from top management's active interest in local governmental affairs?
11. Do you believe that company public relations are benefited by regional stockholder meetings at which management is asked embarrassing questions? Is management's apparent frankness with the stockholders enough to promote good relations?
12. To what extent can vendors' salesmen affect the public relations of a concern which sells to large industries?
13. If the small size of a business suggests that its public relations activity be combined with two other functions in order to give full-time employment to one person, what activities would you select for the combination job?
14. To whom should the director of public relations of a large department store report?

15. For what part of the public relations program would you employ outside professional counsel? At what points of a professional program would you maintain company control? What facts would management need to exercise control, and what program participation would be required of management for effective control?

CASE PROBLEM

THE IMPORTANCE OF PUBLIC RELATIONS

The American Institute of Management made a survey of the public relations activities of 312 well-managed companies in various lines of business, to determine the emphasis they placed on this subject. The percentage distribution of the responses to the questions posed were as follows:

Type of Industry	*Public relations a staff activity* (Per cent)	*Policy-level executive in charge* (Per cent)	*Outside counsel used:* Permanently (Per cent)	*Outside counsel used:* Occasionally (Per cent)
Manufacturing	68	52	28	24
Utilities	85	90	20	70
Railroads	100	100	40	60
Oil companies	83	100	57	43
Banks & insurance	85	85	—	85
Stores	57	100	—	100

In so far as the sample survey indicates trends in the lines of business included, it appears that manufacturing pays the least attention to its public relations, while the railroads take the subject most seriously. It must be recognized that some lines of business — for example, banks, insurance companies and stores — may employ persons trained and experienced in public relations techniques on a full-time basis. Where this situation prevails, there is a natural tendency to give less attention to outside professional counsel. The most important item, based on discussion in the text, appears to be the percentage of companies which consider public relations vital enough to over-all policies to place an executive in charge.

PROBLEMS. Why do manufacturing concerns evidently consider public relations less important than do the railroads? Why do the railroads and oil companies assign their public relation activities to an executive when they employ outside professional counsel on a 40-per-cent and 57-per-cent basis respectively? Why is it reasonable to employ outside counsel at all in those firms employing specialists as full-time staff officers? From your experience, do you feel that the public relations results in the six categories correspond with the statistical findings? For example, do you believe that the railroads, as a group, enjoy the best public relations of the businesses listed?

• *Index*

ABILITY:
  tests of, 396
  of men vs women, 424
Ability to pay, and wage rates, 467
Absences:
  as personnel problem, 422–423
  as fringe benefits, 472–473
  (*See also* Leaves of absence)
Acceptance sampling, 347–350
Accidents: 456–463
  causes of, 459–461, 462
  costs of, 458–459
  frequency rates, 457, 458
  and material handling, 255
  and personnel services, 420–421
  records of, 402
  reduction of, 461–462
  severity rates, 457, 458
  shifting philosophy of, 456–458
Accountants, as business leaders, 157
Accounts receivable, 185
Acid-test ratio, 183–184
Addressograph Company, 296n
Administration:
  vs management, 21, 24, 117
  and planning, 285–287
  skills necessary for, 116–117
Advertising:
  budget for, 210
  of plant sites, 216–217, 220
  vs promotion, 590n
  research, 654
Advisory committees, 147–149
"Agreement shooters," 383
Aircraft industry, 655
Airplanes, inspection of, 354–355
Alford, L. P., 22n, 44n, 64, 75n, 81, 86n, 92n, 120n, 152n, 258n, 311n, 317, 370n
Allegheny Ludlum Steel Corp., 676
Allowances (in time study), 339–340
American Arbitration Association, 437–439
American Brake Shoe Company, 398
American College of Surgeons, 462n
American Federation of Labor, 12–13, 430–433
American Management Association, 552
American Rolling Mills Co., 495n, 551n
American Society of Mechanical Engineers, 21–22, 23, 28, 229ff, 590n, 591n
American Telephone & Telegraph Co., 415
Analysis, principle of, 122
Application forms, 402–403
Apprenticeship:
  bargaining about, 428
  in craft guilds, 4–5
  training, 548, 558
Apron feeders and conveyors, 248
Arbitration, 437–439
Arkwright, Richard, 8
Artisan production, 3–5, 10–11, 409
ASME: *see* American Society of Mechanical Engineers
Aspirin, 451
Aspley, John Cameron, 449n, 450n
Assets:
  definition of, 178–179
  estimating requirements for, 190–192
  sources of, 192–194
  and working capital, 179–181
Assumed risk doctrine, 456
Atmosphere, and health, 454
Attitude appraisal, 647; *see also* Surveys
Auditing: *see* Managerial internal audit
Authority and responsibility:
  in functional organization, 146
  in line organization, 142
  management principle of, 70
  in office management, 620
  organization principle of, 126–127
  and organization structure, 115–116
Autocratic leadership, 81, 142
Automation, 13–15, 292–293, 499–500
Automobile industry:
  collective bargaining, 430
  incentive wages in, 500, 505, 507–508
  inventory control in, 367
  routing and scheduling in, 317–318
Avco Manufacturing Corp., 108–109

Baker-Raulang Company, 255n
Balance:
  management principle of, 68–69
  organization principle of, 128–129
Balance-of-stores record, 372–373
Balsanzi, George, 475
Bangs, J. R., 22n, 75n, 86n, 120n, 152n, 258n, 311n, 370n
Banks, as sources of capital, 193
Barnard, Chester I., 123n
Barnes, Ralph M., 20n, 329, 331, 642, 643
Barth, Carl G., 61
Bausch & Lomb Optical Co., 399, 451
Beach, C. K., 552n
Beatty, H. R., 64, 81, 92n
Beckman, Theodore N., 590n
Bedaux Plan, 492
Belden Manufacturing Co., 267, 268
Bell Telephone Laboratories, 13
Belt conveyors, 246, 247, 248
Benge, Eugene J., 521n
Bergson, Abram, 504n
Bethel, Lawrence L., 49n, 359n
Bethlehem Steel Company, 26, 27, 81, 216
Bidding, 569–570
Bin tags, 371–372
Bittner, Reign, 533n, 540–541
Blanket-purpose charters, 187–188
Board of directors: *see* Administration
Bonds, 40, 189–190
Bonuses:
  for executives, 509
  for production workers, 476, 477, 510
  in standard-time plans, 487–489
  types of, 510
Bower, Marvin, 674n
Braden, J. Noble, 439n
Branch offices, and procurement, 577–578
Braun, Daniel C., 462n
Break-even point, 49–54
Briggs, Herbert S., 501n
Briggs Manufacturing Co., 449
Brooks, Edward P., 553n
Brown, Alvin, 113n, 121n
Brown, Clarence W., 396n, 397n
Brown, Donaldson, 70n
Bucket elevators, 248
Budgetary control: 198–213
  and foreman pay, 103
  and maintenance work, 277–278
  in measuring organization, 131
Budgets:
  and "budgetary honesty," 202–203
  and centralization, 203
  vs cost accounting, 199
  definition of, 198–199
  and department evaluation, 640
  history of, 199–200
  labor, 391–392
  length of, 204, 283
Budgets (*cont.*):
  organizational responsibility for, 204–207
  planning of, 200–202, 286
  scope of, 203–204
  types of, 207–212
Building inventory, 229
Building type, and layout, 226–227, 233
Bullard Company, 293
Bulletin boards, bargaining about, 440–441
Bullock, Charles J., 241n
Bumping, 442n
Burroughs Adding Machines Co., 631n
Business cycles, 56, 285, 292, 472
Business expansion:
  budgetary planning for, 212, 283
  and forms of ownership, 188
  horizontal vs vertical, 32
  and organization structure, 116
  and plant location, 223–224
  research for, 653
Business failures, 177–178
Business location: *see* Location
Buyers' market, 601–605
Buying: *see* Procurement, Purchasing

Call-in pay, 473
Capital: *see* Assets, Ownership, Working capital
Capital budget, 212
Capital investment, planning for, 283–284, 572
Capital market, 193
Card-Sorting System, 518
Carnegie, Andrew, 44
Carrier Corporation, 475n
Cartwright, Edmund, 8
Cary, C. R., 148
Case Problems:
  Acme Products Company, 565–566
  Bon Marché Company, 214–215
  Bradley-Evans Company, 613–614
  Case of Caldwell Mason, 405–406
  Central Register Company, 546–547
  Custom Packing Company, 464–465
  Dixon Distributors, Inc., 176
  Enterprise Iron Foundry, 260–261
  Fireball, The, 426–427
  Franklin Toy Company, 342–343
  Fulford Department Stores, Inc., 589
  Fulmer Benson, Inc., 77–79
  Grennell Corporation, 306–308
  Hansford Manufacturing Company, 196–197
  Horner Castings Company, 445
  Importance of Public Relations, 681
  Jenner Manufacturing Company, 530–531
  Logue-Weaver Paper Company, 235–237

Case Problems (*cont.*):
  Lucas Boat Builders, 279–280
  Minter Supermarkets, Inc., 155
  Monarch Distributing Company, 380–381
  Munford Manufacturing Company, 58
  National Road Machinery Company, 94–95
  Northern University, 133–135
  Powdered Metal Products, 512–513
  Putnam Tools, 362–363
  Roberts Equipment Company, 111–112
  Sebring Engineering and Machine Co., 665–667
  Standard Pumps, 649–650
  Standard Soap Corporation, 481–482
  Tower Mutual Life, 324–325
  United Distributors, Inc., 633–634
Celler Committee, 655
Central control section, 170–174
Central stores:
  how materials get into, 368–369
  how materials get out of, 370–371
  organizational relations of, with inventory control, 365–366
  and routing, 314, 315
  (*See also* Interdepartmental relations, Inventory control)
Centralization:
  and budgetary control, 203
  of inspection, 356–357
  in line-and-staff organization, 144
  of maintenance activity, 272
  of office work, 618–619, 626–627
  of planning activities, 302–303, 314
  of procurement, 568–569, 575, 577–578
  of sales organization, 595–596
  of stores-keeping, 378–379
Chain conveyors, 248
Channels for marketing, 600
Chart-making, 136–141; *see also* Process charts
Chevrolet Company, 247
Cigar industry, 428–429, 502
Circular chart, 138–139, 140
Circulating capital: *see* Current assets
City management, 29, 199
Classification:
  of commodities for purchasing, 576
  of inventory items, 365, 376–377
Classification Plan, 516–518, 524, 527
Clayton Act, 432
Clerical revolution, 14, 627, 629–632
Clerical work:
  incentive pay for, 496
  job descriptions for, 393, 517
  in maintenance department, 270–271
  in procurement, 576–577
  (*See also* Office work)
Climate, and plant location, 222
Closed shop, bargaining about, 428
Clothing industry:
  collective bargaining in, 429
  health program in, 448
  incentive plans in, 499–500, 501–502, 503
  location of, in U.S., 221
Coal-mining industry, 500
Co-determination, 443–444
Cold tablets, 450–451
Collateral trust bonds, 190
Collective bargaining: 428–444
  contract negotiations in, 433–435
  contract provisions in, 435–442; *see also* Union contract provisions
  history of, 428–433
  and the law, 432–433
Collusion, in procurement, 584–585
Combination-purpose forms, 403–404
Command: *see* Directing, Unity of command
Commissions, 497, 607–609
Committees:
  as basic organization form, 147–149
  for budgetary control, 205–206
  for industrial safety, 461–462
  for job evaluation, 518
  for marketing, 597
  for procurement, 579
  for research, 660–661
Commodity classifications, 576
Commodity indexes, 587
Common stock, 188–189
Communication:
  and control, 167
  in dispatching, 321–322
  in maintenance activity, 271–272
  and morale, 412–413
  in office work, 616
  organization principle of, 123
  in organization structure, 116, 120
  in personnel relations, 388
  of standards, 163–164
Community relations, 217, 386, 673–675
Competition, and plant location, 221–222
Components, buying vs producing, 43–44, 274–275, 572
Computations, in office work, 616
Conant, James B., 13
Conferences, training, 555–556
Conflicts, interdepartmental: *see* Interdepartmental relations
Congress of Industrial Organizations, 30, 106, 430–432, 548
Construction industry:
  planning techniques in, 289
  early unionization of, 428, 429–430
Consultants: *see* Management consultants
Consumers: *see* Customers
Container Corporation of America, 450

Continuity, principle of, 128
Continuous production, 294–295, 370
Contribution-to-production theory of wages, 467
Contributory negligence, 456
Control: 156–175
  as a cycle, 159–160
  definition of, 23, 157–158
  and department surveys, 636, 646
  exception principle of, 66–67, 125, 168–169, 639
  of maintenance, 275–276
  management principle of, 71
  of office work, 620–624
  organizational principle of, 123–124
  organizational responsibility for, 165–174
  of overhead, 208
  production: *see* Planning controls
  of research, 658
  research in methods of, 662
  of salesmen, 609
  and scientific laws, 62
  and servo control, 158–159
  span of, 65–66, 124–125
  and standards, 160–165
  Taylor's emphasis on, 27
  as top-executive duty, 84–85
  (*See also* Budgetary control, Inventory control, Production control, Quality control)
Control boards:
  for dispatching, 321
  for maintenance, 275–276
  for production planning, 296, 297
  in scheduling, 317
Control chart (inspection), 350–352
Control limits, 350–352
Controllable costs, 49–54
Controller:
  historical rise of, 157
  responsibility of, for budget, 204–205
Conveyors, 245–248, 253
Cooke, Morris L., 29–30
Coordination:
  and budgetary control, 201–202
  and central control section, 172
  definition of, 23
  and "empire-building," 574–575
  in line organization, 142
  management principle of, 69
  organization principle of, 123
  and planning, 282, 302–304
  and standards, 164
  as top-executive duty, 84
  (*See also* Interdepartmental relations)
Copell, Don F., 91n
Corn Products Refining Co., 227
Corporate group, 140–141
Corporate interest, forms of, 188–190
Corporations, 186–188
Cost accounting:
  vs budgeting, 199, 200
  and inventory control, 366
  job descriptions for, 517
Cost of living, and wages, 466–467
Costs:
  of accidents, 458–459
  in department appraisal, 640–642
  under different wage plans, 485–487, 488, 490
  direct vs indirect, 263–264
  of distribution, 591–593, 603
  of health and safety programs, 462
  of job-evaluation plans, 517, 518, 523
  of maintenance, 262, 263–264, 269, 274–275
  of material handling, 239–240, 254–256, 257
  of office work, 615–616, 622, 629
  of plant sanitation, 453
  of quality control, 361
  of research, 654–658
  of scientific planning, 304–305
  standard, 640–641
  of training programs, 548, 563–564
  and wage levels, 469–470
Cottage production, 5–6
Cotton gin, 9
Cramps Shipbuilding Company, 26
Cranes, 253
Creative leadership, 81
Credit sales, 185, 605
Crompton, Samuel, 8
Current assets, 179ff
Current liabilities, 179ff
Current ratio, 181–183
Customer orders, production for, 294, 322
Customers:
  credit terms granted to, 180, 191
  influence of, on management, 37–39
  marketing services to, 610–611
  and public relations, 673
  stock ownership by, 194
Cycles (time study), 338–339

DANBURY HATTERS CASE, 432
David, Donald K., 82
Davis-Bacon Act, 433
Davis, Joseph S., 187n
Day work:
  definition of, 483
  locale of, 507–508
  measured, 505–506
  vs piece work, 483–484, 488
  rate ranges for, 506–507
  variations of, 505–508
Dealer outlets, 600, 601, 602–603
Dean, Joel, 283n, 284n

Debenture bonds, 190
Debts: *see* Corporate interest
Decentralization: *see* Centralization
Decision
  and committees, 148
  principle of, 70
Defective items, 344, 360
Degree point values, 519, 521–522
Delco Products, 354–355
Delegation:
  and control, 169
  in office management, 620
  management principle of, 66–67
  organization principle of, 125
Democratic leadership, 81
Dental health, 452
Department manuals, 68n, 151, 645–646
Department stores, planning in, 289
Departmental buying, 568, 575
Departments: *see* Interdepartmental relations
Departments, appraisal of: 587, 635–648
  purposes of, 635–637
  measurement techniques for, 637–642, 645–647
  responsibility for, 642–645
  steps in, 645
Depression, 469, 475, 478
Destruction test, 355
Development, definition of, 651; *see also* Research
Dewey Decimal system, 376
Dick, A. B., Products, Inc., 631n
Dickson, William J., 407n
Dictaphone Corporation, 631n
Direct contact, principle of, 129
Directing:
  definition of, 23
  of office work, 617, 623
  of personnel work, 390–391
  and planning, 282
  of procurement activities, 578–580
  of sales activities, 598–599
  as top-executive duty, 83–84
Discipline:
  vs disciplining, 84–85
  handling of, by personnel dept., 421–422
  in line organization, 142
  and service rating, 535
Discrimination clause, 436
Disease, occupational, 447
Dispatching: 320–322
  and communication, 321–322
  control, 321
  definition of, 310, 311
  duties, 320–321
  in different kinds of business, 289–290
  for job shops, 322
  for maintenance, 271, 273
Distribution costs, 591–593; *see also* Marketing
Division of labor, *see* Specialization
Dodge, Harold F., 348, 349
Doepke, Chas. Wm., Mfg. Co., 251
Domestic handicraft production, 5–6
Dougall, Herbert E., 187n
Dow Chemical Co., 657
Downtime, remuneration for, 486, 487, 502
Dun & Bradstreet, 177
DuPont, Lammot, 659
DuPont Company, 55n, 219, 451, 494, 495n, 604–605, 628–629, 652, 655, 657, 659

EARNINGS:
  ceilings on, 497
  curves of, 493
  (*See also* Salaries, Wages)
Eastman Kodak Company, 448, 657, 659
Economic security, and personnel services, 417
Economics of planning, 282–285, 652–653
Edison, Thomas A., 663
Education:
  as factor in job evaluation, 521, 522, 524
  for health and safety, 446–447, 462
  (*See also* Training)
Educational facilities, and plant location, 222–223
Efficiency movement, 27, 28–29, 488–489
Einstein, Albert, 86
Electric Storage Battery Co., 358
Elements (in time study):
  cycles of, 338–339
  definition of, 328
  timing of, 332–333, 334
Elevators, 248, 253–254
Emerson, Harrington, 28–29, 30, 64, 68n
Emerson Efficiency-Bonus Plan, 491, 493
"Empire-building," 130, 574–575, 636
Employee relations: *see* Human relations, Personnel relations
Employee stock ownership, 415–416, 476–478, 670
Employees:
  influence of, on management, 37–39
  personal sales to, 421, 585
  and public-relations program, 654, 670–673
  as safety hazards, 459
  training programs for, 551, 557–558
  (*See also* Labor, Personnel)
Employers' liability laws, 456
Employment activity, 386, 391–404, 407–408, 653; *see also* Selection
Engineering inspection, 354–355
Englert, Norma A., 20n

Enrick, Norbert L., 348n
Equipment inventory, 229, 264–265, 295
Equity capital, 189n
Evaluation: *see* Departments, appraisal of; Service rating; Testing
Evans, G. H., Jr., 187n
Exception principle of control, 66–67, 125, 168–169, 639
Executive assistant, 120–121
Executive committees, 147
Executives: 80–94
  appraisal of, 88–90, 529, 635
  health programs for, 447
  levels of, 118–119
  qualifications for, 116–118
  reaction of, to time study, 340–341
  salaries of, 508–509, 529
  selection of, 87–88
  service rating of, 88–90, 542
  training of, 138, 548–549, 552–554
  types of, 80–81
  (*See also* Middle management, Top management)
Expansion: *see* Business expansion
Expenses: *see* Costs
External financing, 192–194

FAA: *see* Foreman's Association of America
Facilities, coordination of, 295
Fact-finding boards, 470
Factor Comparison, 518–519, 520, 524, 527
Factories, rise of, 6
Facts, principle of, 71
Fair Labor Standards Act, 99, 433, 502
Fashion Frocks, Inc., 42n
Fatigue:
  and methods & time study, 328, 488–489
  and rest periods, 453–454
  Taylor's research on, 61–63
Fayol, Henri, 22, 23, 24n, 30, 64, 65, 114n
Feather-bedding, 41
Federal Products Corp., 359, 360n
Federal Security Act, 99
Federation of Organized Trades and Labor Unions (FOTLU), 429–430
Fellow-servant rule, 456
Felt & Tarrant Mfg. Co., 631n
Feudalism, 3–5
FIFO plan, 374
Filing, 616, 619
Films, 559, 673
Finance budget, 212
Finance companies, 193
Financial management: 177–195
  definition of, 177
  as management problem, 39–40
  planning of, 286
  of small concerns, 194–195
Financial statement, 181–185
Finished-goods markets, 219, 220
Fire hazards, and layout, 226
Firestone Tire & Rubber Co., 479
First aid, 449
Fixed assets, 179ff, 184
Fixed budget, 207
Fixed costs, 49–54
Flexibility:
  and forms of ownership, 187
  and layout, 225
  of line organization, 142
  management principle of, 71
  and manuals, 645–646
  and manufacturing method, 228–229
  organization principle of, 128
  of standards, 163
Flexible budget, 207
"Floats," 369
Flow diagrams, 230, 232
Flow charts, 230–232; *see also* Process charts
Flow of work:
  in measuring organization, 131, 638, 639, 641, 646
  for offices, 627–629, 642–643
  for procurement, 580, 581
Floyd, Joseph S., Jr., 217n
Food service for employees, 418–420, 448, 450
Forced-choice rating plan, 540–541
Ford, Henry, 34
Ford Motor Co., 106–108, 418, 449, 554
Forecasting, 284–285
Foreman's Association of America, 106–108
Foreman's League for Education and Association, 109–110
Foremen: 96–112
  attitudes of, toward personnel dept., 384
  duties of, 97–98, 412
  effects of large-scale production on, 409
  improvement of, 101–102
  incentive pay for, 103–106, 211–212, 489, 492, 496
  manuals for, 151
  as part of management team, 80, 96–97, 101–102, 106–110, 554
  planning by, 288
  problems of, 98–100
  role of, in budgeting, 201
  selection of, 100–101
  service rating by, 506, 534, 542–543
  training for, 101–102, 549, 551–552, 554–557, 562
  unionization of, 106–110
  and vendors, 578
  views of, on morale, 411
  (*See also* Functional foremanship)
Fork trucks, 241–243
Form distribution chart, 299

Formal buying, 569
Forward buying, 585
Fosdick, Raymond B., 663
Foulke, Roy A., 177n, 181n
Fox, Marshall P., 450n
Fringe benefits, 41, 472–474
Functional budgets, 208–212
Functional foremanship, 25–26, 145–147
Functional organization, 145–147
Functional sales organization, 596–597
Functional unit offices, 628–629
Functionalism:
  in budgetary control, 206–207
  principle of, 122, 130, 141, 638

GANTT CHARTS, 28, 317
Gantt, Henry L., 27–28, 64, 71, 75, 296, 317, 492
Gantt Task-and-Bonus Plan, 28, 492, 493
Gardiner, Glenn L., 59
Garment industry: *see* Clothing industry
Garrett, Paul, 679
Garson-Stewart Corp., 453n
Gauges, inspection, 358–359, 360
General Electric Company, 449, 476, 657
General Motors, 45, 107–108, 217, 354–355, 435–436, 467, 553, 594–595, 605, 651, 657, 679
Geographical area, and plant location, 219–220
Geographical location: *see* Location
Geschelin, Joseph, 319n
Ghiselli, Edwin E., 396n, 397n
G.I. Bill of Rights, 99
"Gift horses," and plant location, 216–217
Gilbreth, Frank B., 29, 328
Gilbreth, Lillian, 29
Glass industry, 429–430, 503
Glenn Martin Company, 98n, 297
"Go" and "no-go" gauge, 344, 358
Goethals, Gen. G. W., 148
Going, Charles B., 28
Gompers, Samuel, 12–13
Good will, 599
Goodyear Tire & Rubber Co., 449
Gorgas, Gen. Wm. C., 453
Gotham Hosiery Co., 454n
Gould, Jay, 429
Government agencies:
  "budgetary honesty" in, 202–203
  job evaluation in, 516
  organization charts in, 139
  and public relations, 678
  research by, 654–656
  service rating in, 536
Government regulations:
  and collective bargaining, 432–433
  and forms of ownership, 185–188
  as general management problem, 56
Government regulations (*cont.*):
  and industrial safety, 456
  and plant location, 219, 223
  and portal-to-portal pay, 473
  as procurement problem, 572
  and women in industry, 423–424
  (*See also* Taxes)
Government training aids, 562–563
Graicunas, V. A., theory of, 66n, 124–125
Graphic rating scale, 538–539
Gravity handling, 226, 247
Greenhut, Melvin L., 220n
Grievances:
  collective bargaining about, 437, 438
  and personnel services, 421
  and public relations, 672
  records of, 402
Group annuity plans, 480
Group dynamics and morale, 410
Group incentives, 494–495
Guaranteed annual wage, 471–472
Guild system, 4–5, 514
Gulick, Luther, 66n
Guthmann, Harry G., 187n

HABEGGER, O. F., JR., 397n
Halo effect, 539, 545
Halsey, F. A., 488, 491
Halsey Premium Plan, 487–488, 491, 493
Hand trucks, 241
Handbooks, employee, 389–390, 672
Handicraft production, 5–6
Hargreaves, James, 8
Hartley, E. L., 424n
Hazards to safety, 226, 459–461
Health: 446–455
  cost of programs for, 462
  direct services for, 449–452
  effects of Industrial Revolution on, 11
  indirect services for, 452–455
  industrial vs private medicine, 448–449
  organizational responsibility for, 387, 420–421
  programs for, 446–448
Heavy laboring, law of, 61–63, 489
Hefner, Ralph A., 345n
Heinritz, Stuart F., 376n, 571n
Hernias, 452
Hershey Chocolate Company, 223
Higgins, E. F., 55n
Hiring: *see* Recruitment, Selection
Holidays, bargaining about, 442
Hollberg, Otto, 499n
Hollerith, Herman, 630
Homogeneity:
  management principle of, 66
  organization principle of, 122–123
Hopf, H. A., 115n, 132n
Horizontal chart, 138, 139

Horizontal expansion, 32
Hospitalization of employees, 449
Hours: *see* Working hours
Housekeeping, and accidents, 459–460
Housing facilities, and plant location, 222
Human relations:
  principle of, 72
  and problems of personnel management, 382–383
  (*See also* Personnel relations)
Human variability, 336–338
Husson, Harry L., 265n
Huxley, Aldous, 31n

IDENTIFICATION TAGS:
  in inventory control, 371, 372
  in routing, 316
In-plant feeding, 450
Incentive-pay plans: 487–504
  vs day work, 483–484
  definition of, 485, 488
  for foremen, 103–106, 211–212, 489, 492, 496
  group, 494–495
  for indirect workers, 489, 495–496
  labor's attitude toward, 501–504
  limitations of, 499–500
  locale of, 501, 507–508
  for maintenance workers, 276–277
  multiple-factor measurement in, 492–494
  piece-rate, 485–487
  piece-rate vs standard-time, 487–489, 501–503
  principle of, 74–75
  reasons for failures of, 497–499
  for salesmen, 607–609
  and simulation, 319
  standard-time, 489–493
  union contract provisions for, 440
  for white-collar workers, 496–497, 501
Incentives, nonfinancial:
  vs financial, 408–409, 485
  for foremen, 103–106
Individual productivity, principle of, 73–74
Indoctrination, 400–401
Induction:
  and morale, 411–412
  training, 557
Industrial health: *see* Health
Industrial location: *see* Location
Industrial medicine, 446–449
Industrial peace, 442–444
Industrial Revolution: 1–2, 6–13
  in America, 9–10
  and apprenticeship training, 548
  effects of, on worker morale, 409
  in England, 6–9
  and need for maintenance, 262
Industrial Revolution (*cont.*):
  Second, 13–15
  and wage plans, 484–485
  and wage structures, 514–515
Industrial safety: *see* Safety
Industrial Workers of the World, 430
Industry, growth of U.S., 31–33
Initiative:
  and centralized planning, 302–303
  organizational inducements to, 144
Injury rates, 457, 458, 460
Inland Steel Case, 417
Inspection:
  centralization of, 356–357
  coordination of, 355–356
  engineering, 354–355
  extent of, 356
  fixed-station vs roving, 357
  and inventory control, 364, 367
  as maintenance procedure, 265–269
  methods of, 347–355
  objective of, 344–345
  100-per-cent, 347
  organization of, 360
  planning of, 355
  preventive vs remedial, 346–347, 349–350, 352
  proper times for, 357
  sampling, 347–350
  sorting, 347
  specifications for, 345–346
  tools for, 357–360
  types of, 346–347
Inspection report, 371
Inspection tickets, 314, 315–316
Institutional buying, 569–570, 579
Institutional leadership, 81
Instruction cards, 316
Insurance Company of North America, 610
Insurance for employees, 387, 473–474
Intangibles, role of in science, 62
Intellectual leadership, 81
Intelligence, and placement, 62–63
Interchangeability of parts, 9–10, 344, 350
Interdepartmental relations: 636–637
  of Budgeting, 204–205
  of Central Stores, 314f, 365–366, 368–369, 371, 636
  of Engineering, 302, 304, 636
  of Finance, 617–618, 636
  of General Office, 615, 617–618, 621
  of Inspection, 315–316, 355–356, 360
  of Inventory Control, 365–366, 368–369, 371, 636
  of Marketing, 304, 605–606, 617–618, 636
  of Material Handling, 245, 257, 304
  of Personnel, 304, 385–386, 615, 618, 636
  of Planning, 300–304, 314–316

Interdepartmental relations (*cont.*):
  of Procurement, 304, 364, 365–366, 368–369, 371, 570, 572, 574–576, 615, 618, 621, 636
  of Production, 304, 314–316, 605–606, 617–618, 636
  of Production Control, 314–316
  of Research, 636
  of Traffic, 636
Interests, tests of, 397
Intermittent production, 295, 314
Internal financing, 192
Internal Revenue Code, 188n
International Business Machines, 631n
International Foundry Workers Union, 423
International Ladies' Garment Workers' Union, 448, 501
International Management Congress, 30
Interviews:
  for appraising a department, 644–645
  exit, 394–395, 423
  general, 394
  hiring, 394
  records of, 402
  of vendors, by Purchasing, 571
Inventions, in Industrial Revolution, 7–10
Inventories:
  building, 229, 264–265
  determining ordering quantities for, 375–376
  equipment, 229, 264–265
  perpetual, 372
  transportation, 229
Inventory control: 364–380
  advantages of, 366–368
  centralization of, 378–379
  classifications for, 376–377
  five elements of, 365
  forms for, 371–374
  functions of, 364–365
  organization for, 365–366
  problems of, 366
  simplification of, 377–378
  standardization in, 377–378
  symbols for, 376–377
Inventory-turnover ratio, 184–185
Inventory week, 368
Investment inventory, 367
Invitation-to-bid form, 586

Jack & Heinz Company, 412, 448
Jack, William, 448
Job analyses, 392–393, 516, 521
Job classifications, 401
Job descriptions, 392–393, 516, 517
Job evaluation: 514–529
  Classification Plan for, 516–518
  definition of, 515
  Factor Comparison Plan for, 518–519
Job evaluation (*cont.*):
  Job Ranking Plan for, 518
  manuals for, 523–524
  in measured day work, 505
  Point System for, 519–523
  and rate-setting, 524–527
  responsibility for, 527–528
  vs service rating, 515–516, 532
Job Ranking Plan, 518, 524, 527
Job requisitions, 398–399
Job-shop dispatching, 322
Job specifications, 392–393, 516
Job stabilization, 472
Job-to-Job Comparison Plan, 518
John Hancock Mutual Life Ins. Co., 418
Johnson, Joseph F., 86n
Jome, Hiram L., 190n, 192n
Jones, Philip W., 515n
Jones and Laughlin Steel Company Case, 107
Junior Board: *see* Multiple management

Kahn, Robert, 424
Kaiser-Frazer Co., 474, 510
Katz, Daniel, 424
Katz, R. L., 117n
Kay, John, 8
Kearney Works, 265–266
Kelly, Marvin J., 13
Kennedy, Van Dusen, 504n
Kettering, Charles F., 13, 651, 658
Keystone Occupational Visual Service, 399
Kirk, H. L., 413n
Knights of Labor, 429–430
Koppers Company, Inc., 126
Kreger, H. Randall, 177n, 179n

Labor:
  budget for, 211
  as factor in plant location, 216–222
  and foremen, 98–99, 106–110
  and Industrial Revolution, 10–11, 12–13
  as management problem, 40–41
  and operating standards, 55
  and problem of personnel management, 382–383
  (*See also* Collective bargaining, Employees, Union contract provisions, Unions)
Labor attitudes:
  toward cafeteria, 418–419, 450
  toward health programs, 447, 448
  toward incentive wages, 486–487, 500–504
  toward profit sharing, 476
  toward service ratings, 533
  toward time study, 333, 340–341, 488–489, 503

Labor attitudes (*cont.*):
  toward wage rates, 466–468
Labor budget, 391–392
Labor-market survey, 525–527
Labor relations, vs personnel relations, 385–386
Lamb, Charles, 86
Lamperti, Frank A., 166n
Lansburgh, Richard H., 621n
Laws:
  vs principles, 59–64
  (*See also* Government regulations)
Lawyers, and collective bargaining, 434–435
Layoffs, 439–440, 534
Layout: 224–234
  basic considerations for, 226–227
  and flexibility, 225
  and material handling, 224–225, 226, 252, 257
  and methods and time study, 326
  planning for, 224–225, 229–233
  product vs process, 227
  and type of manufacturing, 227, 294–295
  (*See also* Office layout)
Layout flow chart, 299
Leadership:
  of conference training, 556
  at different eras, 156–157
  principle of, 68
  situational determinants of, 85
  tests for measuring, 100–101
  types of, 80–81
Leather industry, 502
Leather Research Institute, 657
Leaves of absence, 441–442
Leeds & Northrup, 148
Leffingwell, William H., 624
Lenin, V. I., 30
Lesseps, Vicomte F. M. de, 453
Leveling (time study), 336, 338–339
Lewis, Howard T., 571n
Lewis, John L., 107
Lewis-Shepard Products, Inc., 242
Liabilities, 178–181
LIFO plan, 374
Lift trucks, 242–243, 254
Line organization, 141–142
Line-and-staff organization:
  definition of, 142–145
  for maintenance dept., 270
  (*See also* Staff function)
Link-Belt Company, 248
Living standards, and plant location, 217
Loaders, automatic, 249
Loan companies, 194
Location: 216–224
  and decentralization, 54
  factors to be considered in, 218–224
Location (*cont.*):
  and "gift horses," 216–217
  and morale, 416–417
  of offices and office buildings, 627
  and source of supply, 582
  and specialization, 46
  and type of building, 226
Lockheed Aircraft Corp., 276
Lockouts, 442
Long-term liabilities, 179ff
"Loose" times, 489
Lormer, H. W., 218n
Lowden, J. A., 103–106
Lubrication, machine, 269–270, 276–277
Lump sum budget, 207

MACHINE INSPECTION RECORD, 266–267
Machine replacement, 46–48, 283
Machines:
  mobile, 250–251
  and type of layout, 227–229
  types of, and routing, 316
  upkeep of, 262–270
Macy, R. H., & Co., 510
Magazines, employee, 672
Mail-order businesses, 290, 354
Maier, Norman R. F., 453n
Maintenance: 262–279
  controls for, 275–276
  cost of, 263–264, 269, 274–275
  engineer's report form, 268
  incentive pay for, 276–277
  management of, 273–277
  organization of, 270–272
  policies for, 272–273
  preventive, 265–270
  rules for, 278
  scope of, 262–263
  and success of incentive plans, 498
Maisel, Albert Q., 604n
Mallick, R. W., 252
Mallory Company, 418
Man-to-man rating plan, 539–540
Management:
  background of modern, 1–13
  contributions of, to U.S. society, 35
  current trends in, 13–15, 30–35
  definition of, 21–24
  five elements of, 1–2
  five functions of, 23–24, 281–282
  four pulls on, 37–39
  levels of, 118–119, 140–141, 285–288
  literature on, 20–21
  objectives of, 30–31
  of offices, 615–632
  and ownership, 33–35
  of research, 663
  research in methods of, 661–662
  survey of problems of, 37–57

Management (*cont.*):
  three methods of, 661–662
  (*See also* Executives, Middle management, Scientific management, Top management)
Management consultants:
  for collective bargaining, 434–435
  for department surveys, 642–645
  for job evaluation, 527–528
Management principles: 59–76
  chief types of, 64, 73
  definition of, 59–64
Management team, 80–112; *see also* Foremen, Middle management, Top management
Managerial economics, 282–285
Managerial internal audit, 173
Manorialism, 3–5
Manuals:
  department, 68n, 151, 645–646
  employee, 389–390, 672
  foreman, 151
  job-evaluation, 523–524
  office, 622
  organization, 150–151
  policy, 68n, 131, 151, 389
Manufacturing: *see* Production
Marchand Calculators, 631n
Marginal analysis, 284
Market research, 604–605, 653–654
Market theory of wages, 468
Marketing: 590–612
  and business leadership, 156–157
  in a buyers' market, 601–605
  cost of, 591–593
  director of, 598–599
  "empire-building" in, 574–575
  as management problem, 42
  and packaging, 609–610
  planning for, 286
  policy decisions for, 599–601
  vs sales, 590–591
  and sales quotas, 607–609
  and services, 610–611
  and type of manufacturing, 294
  types of organization for, 593–598
  (*See also* Interdepartmental relations, Sales)
Markets, and plant location, 220
Marshall, Chief Justice, 186n
Marsto-Chron machine, 333
Marx, Karl, 504
Maryland Drydock Case, 107
Material control: *see* Inventory control
Material handling: 238–259
  advantages of proper, 240–241
  and centralized inspection, 356
  choice of proper equipment for, 252–256, 257–258
  cost of, 239–240, 254–256
Material handling (*cont.*):
  and layout, 224–225, 226, 252
  and marketing, 603
  objectives of, 257–258
  organization for, 256–257
  principles of, 257–258
  types of equipment for, 241–251
  and type of manufacturing, 294, 295
Material-identification card, 314
Material requisitions, 314–315
Materials budget, 210
"Materials Management," 574
Max & Min plan, 374–375
Maynard, Harold H., 590n
McBee Company, 631n
McCabe-Powers Auto Body Co., 275
McCormick Spice Company, 150
McKinsey, James O., 199
McQuaig, J. H., 88n
Meany, George, 431
Measured day work, 505–506
Measurement: *see* Departments, appraisal of; Testing
Mechanical Handling Systems, Inc., 249
Mechanization:
  and incentive-pay plans, 499–500
  of office work, 629–632
  stages of, 292–293
Median, computation of, 335–336
Merchandising, 354
Merit rating: *see* Service rating
Merrick, Dwight V., 328
Merrick Multiple Piece-Rate Plan, 490–491
Metal-cutting, Taylor's work on, 18–19, 60
Methods:
  analysis of, 328–329, 344–345
  as control tools, 160, 162
  in department surveys, 640
  and layout, 225, 326
  vs procedures and systems, 17–18
  and statistical quality control, 354
Methods and time study: 326–341
  advantages of, 326–328
  charting of, 329–330
  computations for, 334–340
  equipment for, 330–333
  history of, 29, 328, 487–489
  labor's reaction to, 340–341
  in material handling, 254–255, 257
  standard symbols for, 329
  steps in, 333–334
  in various incentive plans, 489–492, 497–499
Methods-Time-Measurement (MTM), 340
Metropolitan Life Ins. Co., 551n, 658n
Middle management: 91–94
  composition of, 91–92
  duties of, 92–93
  planning responsibilities of, 286, 287
  qualifications for, 93–94

Midvale Steel Company, 25, 26, 328
Military organization, 141–142, 143, 170
Milwaukee Journal, 415–416
Minimum wages, 502
Mitchell, Don C., 54
Mobile maintenance shop, 275
Modal values, for elements, 335–336
Monroe Calculating Machine Co., 631n
Mooney, James D., 24, 113n, 123
Montgomery Ward, 284
Morale: 409–416
  and chart-making, 138, 141
  and communication, 412–413
  components of, 410–411
  definition of, 409–410
  and discipline, 85
  effects of mass production on, 409, 485
  and induction practices, 411–412
  and inventory control, 368
  of office workers, 625–626, 628–629
  and service rating, 533–534
  and simultation, 319
  and stock ownership, 415–416
  and suggestion systems, 413–414
  surveys, 414–415, 640
  and training, 551
Morse Manufacturing Co., 250
Mortgage bonds, 190
Moses, 67n
Motion study: *see* Methods and time study
Mt. Clemens Pottery Case, 473
Move tickets, 311, 314, 316, 321
Mule, spinning, 8
Mult-Au-Matic machine, 293
Multi-column process chart, 298
Multiple-factor measurement, 492–494, 500
Multiple management, 92, 150
Murray, Philip, 30
Music, and industrial health, 455

NATIONAL ASSOC. OF COST ACCOUNTANTS, 49
National Assoc. of Manufacturers, 447, 462n, 463
National Assoc. of Suggestion Systems, 413
National Bureau of Standards, 573
National Cash Register Co., 631n
National Foreman's Association, 411n
National Industrial Conference Board, 124, 204–205, 499n, 509, 655n, 668
National Industrial Recovery Act, 433
National Labor Relations Act, 40
National Labor Relations Board, 107, 108, 109, 433
National Safety Council, 457, 460
National Tag Company, 150, 476
Negotiated buying, 569–570
Negotiation: *see* Collective bargaining
Nelson, Thomas H., 20n, 22, 23
Net worth, 182, 184
Net working capital, 179n
Neuschel, Richard F., 17n
New York University, 663
Newcomb, Theodore M., 424n
Newcomen, Thomas, 8–9
Newman, William H., 148
Night-shift differential, 473
Niles, Henry E., 616n
Nobel Prizes, 657
Noise, industrial, 454–455
Normal curve, 336–338, 352–353, 539
Norris-LaGuardia Act, 433

OBJECTIVES:
  planning of, 285–287
  statement of, as organization principle, 121, 130, 638
Office layout:
  general, 627–629
  for procurement, 580
Office machines, 14, 626, 629–632
Office manager, 617, 618
Office of Strategic Services Assessment Staff, 100–101
Office work:
  centralization of, 618–619, 626–627
  costs of, 615–616, 622, 629
  duties of, 616–617
  incentive plans for, 496
  management problems of, 615, 617, 619–624
  organization of, 617–619
  physical facilities for, 627–632
  standardization of, 624–626
  techniques for, 624–627
  (*See also* Clerical work)
On-the-job training, 557–558, 607
"One best way," 29, 163, 312
100-Per-Cent Premium Plan, 489–490
Open-house techniques, 671–672
Operation analysis:
  in department evaluation, 635, 639–642
  and layout, 229
  and time study, 327
Operation process charts, 230–231, 299
Operation times, 312, 314; *see also* Methods and time study, Standard times
Ordering quantities, determination of, 375–376
Organization: 113–155
  of budgeting, 200, 204–207
  of central control, 171
  definition of, 23, 24, 113–115
  of departments, 637–639
  and "empire-building," 130, 574–575
  formal vs informal, 83
  of inspection, 360

Organization (*cont.*):
  of inventory control, 365–366
  of maintenance department, 270–272
  of marketing, 593–598
  for material handling, 256–257
  measurement of, 129–131, 141
  of office work, 617–619
  of personnel activities, 384–386
  of planning, 285–288, 300–304
  primary levels of, 116–117, 140–141
  principles of, 121–129
  of procurement, 575–580
  of public relations, 678–679
  for research, 660–661
  structural elements of, 115–121
  techniques of, 136–155
  as top-executive duty, 83
  types of, 141–150
  (*See also* Interdepartmental relations)
Organization charts: 136–141
  forms for, 138–140
  for maintenance, 270, 271
  for marketing, 594–598
  for personnel, 385
  for planning activities, 286, 302
Organization manuals, 150–151
Ortho-Rater, 399–400, 451
Oscillating feeder conveyors, 248
Otto, Erich A., 177n, 179n
Output, restriction of, 484, 497
Overhead, control of, 208, 211–212
Overhead conveyors, 246, 248, 275
Ownership:
  forms of, 185–188
  and management, 33–35
  (*See also* Stockholders)

PACKAGING, 603, 609–610
Packard Case, 107
Packard Motor Car Co., 275
Paper-work, 622–623
Paired-comparison rating scale, 539
Pallets, 234, 243–245
Parolees, hiring of, 398
Partnerships, 185–186
Paternalism, 388, 416
Paul, Lewis, 8
Peak-and-valley workloads:
  and type of manufacturing, 294
  in offices, 625–626
Pennsylvania Railroad, 242
Pensions, 478–480
Perry, W. C., 625n
Persius, 5n
Person, H. S., 483n
Person–injury sequence, 461
Personality traits:
  personnel tests for, 396–397
  in salesman selection, 606–607
Personality traits (*cont.*):
  in service rating, 535–537, 540–541
Personnel director, 384, 385–386, 390–391
Personnel management: 382–404
  appraisal of, 637
  and business leadership, 157
  directing of, 390–391
  employment activities of, 286, 391–404
  foundations of, 382–384
  forms for, 402–404
  functions of, 386–387
  history of, 390
  organization of, 384–386
  vs personnel relations, 407–408
  policy manuals for, 68n
  principles and policies of, 387–390
  problems of, 383–384
  records for, 402
  (*See also* Interdepartmental relations)
Personnel relations: 407–425
  and discipline, 421–423
  and grievances, 421–423
  and morale, 409–416
  vs personnel management, 407–408
  principles of, 388–389, 416
  and productivity, 408–409
  services of, 416–421
  and women in industry, 423–424
Persuasive leadership, 81
Petersen, Elmore, 22n, 66n
Philadelphia Electric Company, 466–467
"Phons," 454–455
Physical job requirements, 398–400
Picard, Frank, 473
Piece work:
  current use of, 501–503
  vs day work, 483–484, 488
  definition of, 483
  earning curve for, 493
  problems raised by, 485–487
  vs standard-time plans, 487–489
Pitney-Bowes, Inc., 631n
Placement:
  and intelligence, 62–63
  principles of, 400
  and service rating, 535
Planning: 283–305
  and budgets, 198–199, 200–204
  by central control section, 172
  centralization of, 302–303
  charts for, 296–300
  cost of, 304–305
  definitions of, 23, 281–282
  economics of, 282–285, 652–653
  in functional organization, 145–146
  of inspection, 355
  for layout, 224–227, 229–233
  in line organization, 142
  for the major activity, 288–290
  of office work, 621–624

Planning (*cont.*):
  organizational relationships of, 300–304
  period, 283–284
  for preventive maintenance, 265–270
  principle of, 67
  production, *see* Production planning
  Taylor's theories of, 27, 67, 285, 288
  as top-executive duty, 82–83
  types and levels of, 285–290
Planning boards: *see* Control boards
Planning controls: 309–323
  scope of, 309–310
  (*See also* Scheduling, Routing, Dispatching)
Plant and equipment budget, 212
Plant-keeping, 452–453
Plant location: *see* Location
Plant size, and location, 223–224
Planty, Earl G., 552n
Plowman, E. Grosvenor, 22n, 66n
Plug gauge, 358–359
Point System, 519–523, 524, 527–528
Policies:
  departmental, 647
  for maintenance, 272–273
  for personnel management, 387–390
  for training, 549–550
  for wage administration, 468
Policy committees, 147
Policy-making:
  as administrative function, 21, 24, 285–287
  in marketing, 599–601
  in organizational analysis, 131
  principle of, 67–68
  in procurement, 580–585
  top management's role in, 287
  worker participation in, 416
Policy manuals, 68n, 131, 151, 389–390
Portal-to-portal pay, 473
Portland Cement Association, 656
Positional leadership, 81
Power loom, 8
Power supply, and plant location, 219, 221
Preferred stock, 189
Premiums (incentive plans), 487–489ff
Press, and public relations, 677–678
Price appeal vs sales appeal, 603–604
Price-sensitive commodities, 576, 599
Prices, and wages, 466–467, 468–470
Pricing:
  of inventory items, 374
  as marketing decision, 599–600, 601
  and research, 652
Principles:
  and "fact-finding," 470
  as laws, 59–64
  of management, 64–76
  of organization, 121–129
  of personnel management, 387–389
Printing industry, 428, 429–430
Probationary employees, 534
Probability sampling, 347–350
Procedures:
  as control tools, 160, 162
  vs methods and systems, 17–18
  for office work, 622
Process charts:
  definition of, 229–232
  for office work, 622, 642–643
  and planning, 296–300
  for procurement, 580
  six types of, 298–299
  symbols for, 230
  in time study, 330
Process layouts, 227–229
Procter & Gamble, 415
Procurement: 567–588
  appraising department operations in, 587, 637, 646
  centralized vs decentralized, 568–569, 575, 577–578
  control of, 646
  director of, 578–580
  forms and procedures for, 585–587
  institutional vs negotiated, 569–570
  organization of, 575–578
  physical layout of, 580, 581, 627
  policy decisions for, 580–585
  vs purchasing, 567
  relation of, to inventory control and central stores, 364–366, 368–369, 371, 572
  responsibilities of, 570–575
  (*See also* Interdepartmental relations, Purchasing)
Product layouts, 227–229
Product research, 652, 653, 661
Production:
  budget for, 210
  of components, vs buying, 43–44, 274–275, 572
  continuous vs intermittent, 294–295
  control, 310; *see also* Planning controls
  costs: *see* Costs
  historical types of, 2–7
  recent growth of, 31–33
  relation of, to material handling, 254
  specialization of, vs diversity, 44–46
  stock vs order, 293–294
  types of, 293–295
  volume of, and costs, 591–593
Production bonus plan, 477
Production cycle:
  and length of budget, 204
  and production planning, 292
  and working capital, 180, 191
Production design, 295
Production-expense budget, 211–212

Production-order requisitions, 371
Production planning: 290–296
  definition of, 290–291
  need for, 291–292
  organization for, 300–304
  summary of requirements for, 295–296
  by type of manufacturing, 293–295, 301
  (*See also* Planning controls)
Production standards for workers, 440
Productivity:
  increases in American, 31–33
  motivating, 408–409, 424
  in office work, 626
  principle of, 73–74
  and wage plan, 484–487, 495
  and wage rates, 467, 469–470
Proficiency tests, 396
Profit motive, 30–31
Promotion:
  chart, 561–562
  of employees, 401, 534
  of executives, 87–88, 93
  (*See also* Advertising)
Property records, 264–265
Profit sharing, 474–476, 480
Proprietorships, 185
Proxy, management by, 33–35, 444, 675
Prudential Insurance Co., 631
Psychology, in scientific management, 62–63; *see also* Personality traits, Personnel relations
Public:
  influence of, on management, 37–39
  and marketing, 599
Public institutions, procurement for, 569–570, 579
Public relations: 668–680
  and the community, 673–675
  and customers, 673
  and employees, 670–673
  and government, 678
  objectives of, 668–669
  organization of, 678–679
  and press and radio, 677–678
  professional counsel for, 679
  and research, 654
  and stockholders, 675–677
  and vendors, 677
Purchase requisitions, 371, 586
Purchasing:
  budget for, 210–211
  foreman's role in, 99
  as management problem, 43
  vs procurement, 567
  vs producing, 43–44, 572
  serialized, 567
  (*See also* Procurement)
Purchasing power, in 12 nations, 35
Putting-out plan, 6
Pyramidal charts, 138, 139, 142

QUALITY:
  and incentive wages, 486–487, 492–494, 500
  in procurement, 582–583
Quality control: 344–361
  objectives of, 344–345
  specifications for, 345–346
  standards for, 345
  statistical, 350–354
  (*See also* Inspection)
Quantities, control of, 374–376
Quick ratio, 183–184

RADIO, and public relations, 677–678
Radio Corporation of America, 553
Railway Brotherhoods, 470
Railway Labor Act of 1926, 433, 470
Random wage rates, 507–508
Rate ranges:
  advancement through, 506–507, 534
  in measured day work, 505
  setting the limits of, 524–527
Rathe, Alex W., 162
Rating (in time study), 336, 338–339
Ratio analysis:
  in determining foreman pay, 104–106
  in financial management, 181–185
  in maintenance control, 264
Rautenstrauch, Walter, 49n, 198n, 283n
Raw materials:
  and plant location, 219
  and production planning, 295
Receiving:
  and central stores, 369, 371
  and material handling, 254
Receiving reports, 371
Reciprocal buying, 584
Recognition clause, 436
Records:
  as control tools, 160–161
  and department appraisal, 646–647
  for industrial health, 455
  for inventory control, 365, 367, 369, 371–374
  for maintenance, 263, 264–265, 267–270
  in office work, 616, 623–624
  for personnel controls, 402
  for research, 664–665
Recreation:
  and industrial health, 449–450
  as personnel service, 417–418
  and plant location, 222–223
Recruitment:
  and service rating, 534–535
  sources of, 393–394
  through sports, 386
References (employment), 397–398
Reflectoscope, 359

Regulations:
  for worker conduct, 422
  (*See also* Government regulations)
Reliability measures:
  definition of, 395–396
  in service rating, 544
Relocation of businesses, 216, 217–218
Remington, Philo, 630
Remington Rand, 296n, 604, 631n
Reports:
  as control tools, 160–161
  and department evaluation, 646–647
  for inventory control, 371
  for office work, 623–624
  to stockholders, 675–676
Representation clause, 436
Requisitions:
  inventory, 368, 370–371
  job, 398–399
  purchase, 586
Research: 55–56, 651–665
  applied, 651
  controls for, 167–168
  cost of, 657–658
  definition of, 651–652
  fields of, 652–654
  government, 654–656
  growth of, 654–655
  industrial, 656–657
  management of, 663
  in management methods, 661–662
  market, 604–605, 653–654
  organization of, 660–661
  private, 657
  pure, 651, 664
  and taxes, 658–659
  Taylor's emphasis on, 27
  university, 657
  value of, 659–660
  and war, 662–663
Responsibility: *see* Authority and responsibility
Rest periods, 453–454
Restriction of output, 41
Retailing, and inventory control, 365
Retirement plans, 478–480
Reuther, Walter, 431
Reynolds, Lloyd G., 469n
Richardson, Edmund F., 452n
Right-and-left-hand charts, 330, 331
Rocker truck, 250
Roethlisberger, F. J., 97, 407n, 410
Roller spinning frame, 8
Romig, Harry G., 348, 349
Route sheets, 312, 313, 314
Routing: 311–317
  definition of, 310–311
  in different kinds of business, 289–290, 295
  forms for, 314–316
Routing (*cont.*):
  and scheduling chart, 317, 318
Rowan Premium Plan, 491, 493
Rubber industry, 430
Rule-of-thumb management: 33–34
  definition of, 17
  and service rating, 532
  and quality control, 347–348
Rules:
  for employee conduct, 422
  vs laws and principles, 63
Ruth, Babe, 86

SAFETY: 456–463
  and maintenance, 277
  organizational responsibility for, 387
  program for, 446–447
  (*See also* Accidents)
Salaries:
  of executives, 508–509
  of foremen, 103–106
  of salesmen, 496–497, 501, 607–609
Sales:
  and break-even point, 49–54
  and budgetary planning, 201, 208–210
  to employees, 421, 585
  intensive vs extensive, 600
  vs marketing, 590–591
  quotas, 607–609
  (*See also* Marketing)
Sales appeal vs price appeal, 603–604
Salesmen:
  incentive pay for, 496–497, 501, 607–609
  responsibility of, in budgeting, 208–209
  role of, in procurement, 571, 578
  selection of, 396–397
  training of, 606–607
Salter, Sir Arthur, 129
Salvage, 344, 365
Sampling inspection, 347–350
Sanitation, 452–453
Savings: *see* Costs
Scalar process, principle of, 123
Scheduled budget, 207–208
Schwab, Charles M., 81
Scientific management:
  for cities, 29
  definition of, 16–20
  and industrial safety, 456
  labor's reaction to, 430
  laws and principles in, 59–64
  in offices, 619–620, 624–625
  pioneers of, 24–30
  for universities, 29–30
Scrap:
  control of, by foremen, 103–106
  and inspection, 344
  and inventory control, 365

Screw conveyors, 248
Scheduling: 317–320
  definition of, 310–311
  and incentive-pay plans, 498
  in maintenance, 265–269, 273–274, 275–276
  periods, 319–320
  for procurement, 571
  and routing chart, 317, 318
  in various kinds of business, 289–290, 295
Sears Roebuck, 42n, 284, 389–390, 480, 553n
Selection:
  of executives, 87–88, 398
  of foremen, 100–101
  and health of applicant, 446
  of salesmen, 606–607
  techniques of, 398–400
Selective selling, 600–601
Sellers' market, 601–602
Seniority:
  and rate-range advancement, 506–507, 583
  union contract provisions for, 439–440, 441
Serf production, 3
Serialization of activities, 574–575
Service departments, 637
Service industries, planning in, 290
Service ratings: 532–546
  and advancement through rate range, 506–507, 534
  criteria for, 537–538
  definition of, 515–516
  factors, grades and degrees for, 535–537
  frequency of, 544
  vs job evaluation, 515–516, 532
  in measured day work, 505
  purposes of, 533–535
  records of, 402
  responsibility for, 542–543
  scope of, 541–542
  size of group for, 543–544
  systems of, 538–541
  training for, 544–545
  ways of appraising, 544, 640
Services:
  general-office, 616–617
  and marketing, 610–611
  measurement of departmental, 637
  and procurement, 582
  research for, 652
Servo control, 158–159
Severance pay, 473
Shaffer, B. H., 218n
Sheldon, Oliver, 22, 114n
Sherman, Joseph M., 499n
Sherman Anti-Trust Act, 432
Shipping, 254
Shoe industry, 428, 502
Sick leave, 472–473
Simo charts, 330, 331
Simple average time, 334–335
Simplification:
  of inventories, 377–378
  management principle of, 73
  of office work, 624–625
  organization principle of, 127
  of product line, 601
  in routing, 312, 316
Simultation, 317–319
Size of business:
  and financial management, 194–195
  and health & safety programs, 463
  and incentive-pay plans, 499
  and location, 223–224
  and office management, 615, 618
  and personnel organization, 384–385
  and planning levels, 288
  and procurement, 575–576
  and research, 55–56, 664
  and responsibility for control, 165–166, 169–170
  and scientific planning, 304–305
  and service-rating plans, 533
  and suggestion systems, 413
  (*See also* Plant size)
Skids, 244
Skilled workers:
  and artisan production, 3–5, 10–11, 409
  incentive wages for, 500
  and plant location, 218, 221
Slave production, 2–3
Slichter, Sumner H., 674n
Sloan, Alfred P., Jr., 553n
Slote, Leslie M., 137
Small businesses:
  financing of, 194–195
  health programs for, 463
  planning levels in, 288
  responsibility for control in, 165–166
  (*See also* Size of business)
Smith, Adam, 5n
Smulski, Edward, 26
Snap gauge, 359
Social Security Act, 417, 471–472, 478
Socialist Labor Party, 430
Socialist Party, 430
Society for the Advancement of Management, 552
Somervell, Brehon, 126
Sorg Paper Company, 436–437, 442n
Sorting inspection, 347
Southern Research Institute, 657
Soviet Union, incentives in, 504
Span of control:
  in line organization, 142
  as management principle, 65–66
  as organization principle, 124–125

Spates, Thomas G., 382n
Specialization:
  and centralized inspection, 356
  and coordination, 69
  vs diversity, 44–46
  and "empire-building," 574–575
  in maintenance activity, 270
  management principle of, 44n, 73
  organization principle of, 127–128
  and need for production planning, 291
  and type of manufacturing, 295
  and type of organization, 142, 144, 145–146
Specification limits, 350–352
Specifications:
  job vs man, 392
  for procurement, 572–574, 583–584
  for quality control, 345–346, 350–352
  (*See also* Job specifications)
Spectrograph, 358
Speed-up, 486–487, 490
Spinning jenny, 8
Split premium, 489, 492
Sports programs, 386, 417–418, 449–450
Spriegel, William R., 621n
Staff function: 142–145
  and control, 165, 170–174
  and decline of morale, 409
  management principle of, 68
  organization principle of, 126, 146
  in personnel activities, 384–385
Standard & Poor's Security Agency, 660
Standard data, 340
Standard deviation, 352–353
Standard operating procedures: *see* Standard practice instructions
Standard practice instructions:
  definition of, 152–154
  in department surveys, 640
  in maintenance, 273
Standard times:
  advantages of, 327
  determination of, 334–340, 487–489
  in maintenance work, 276–277
  in production planning, 296
  "tight," 336, 489, 497
Standardization:
  by inventory control, 367–368, 377–378
  and maintenance savings, 274
  management principle of, 70
  in material handling, 243–245
  of office work, 624–626
  organization principle of, 127
Standards: 160–165
  as control tools, 160–161
  definition of, 161–163
  development of, 163
  examples of, 164
  for foreman incentives, 103–106
  generality of, 161–163
Standards (*cont.*):
  in office work, 621, 624–625
  operating, 54–55
  place of, in control cycle, 159–160
  in procurement, 572–574
  for quality control, 345–346, 360
  for service activities, 637
  Taylor's emphasis on, 27
  transmission of, 163–164
Stark, L. M., 672n
Starkweather, Louis P., 177n, 179n
Statistical quality control, 350–354
Statistics, as control tools, 160
Statute of Laborers, 432
Steam engine, 8–9
Steel industry, 429–430
Steinmetz, Charles, 86, 663
Stenographic pools, 618n, 619, 626
Step budget, 207
Stocker, Harry E., 241n
Stockholders:
  and control of business, 33–35, 188, 193
  employees as, 194, 415–416, 476–478, 670
  influence of, on management, 37–39
  and public relations, 675–677
Stockroom for maintenance, 271
Stocks, 40, 188–189, 194
Stock-taking, perpetual, 368, 372
Stop watches, 330, 332–333
Stores-keeping: *see* Central stores
Stores ledger, 374
Stroboscope, 359
Strikes, 429, 430, 432, 442
Strong Vocational Interest Blank, 397
Studebaker Corp., 500
Stump, N. Frank, 451n
Subfloor tow-line, 249–250
Suggestion systems, 413–414
Supermarkets:
  inventory control in, 365
  service in, 611
Supervisors:
  and centralized planning, 302–303
  vs foremen, 96n
  and service rating, 537, 542–543, 545
Supplies, standardization of, 367–368, 378
Supply, sources of, and procurement, 571, 582
Surplus items, disposal of, 571
Surveys:
  in department evaluation, 635–648
  of employee attitudes, 671
  of morale, 414–415, 654
  of public opinion, 654
Swanson, Guy E., 424n
Swisher Cigar Company, 424, 425
Sylvania Electric Products, Inc., 54
Symbols, for inventory control, 376–377
Synthetic times, 340

Systematic management, 17–20
Systems:
  for material handling, 254
  vs methods and procedures, 17–18, 621
  for office work, 621–622
  and organization, 136
  as tools of control, 160, 162

TAFT-HARTLEY ACT, 40, 96, 99, 106, 107, 108, 433, 554
Task and accomplishment, principle of, 74
Taxes:
  and bonuses, 510
  and executive salaries, 509
  and forms of ownership, 185–188
  and origin of budgeting, 199
  and plant location, 216–217, 222
  and population growth, 11
  and research, 658–659
Taylor, Frederick W., 18–19, 24–27, 37, 60–63, 64, 67, 74, 125n, 127n, 145–147, 156n, 168, 285, 288, 328, 376–377, 488–489, 490
Taylor Management Laboratory, 657
Taylor's Differential Piece-Rate Plan, 28, 490
Technological change: *see* Mechanization
Templates, 233, 580
Territorial sales organization, 595–596
Testing, in personnel work, 395–397, 398–399, 607
Texas Engineering and Mining Co., 275
Textile industry:
  incentive wages in, 502
  in Industrial Revolution, 7–9
Textile Workers' Union, 475
Therbligs, 328
Thermocouple, 359
Thompson, C. B., 18n, 26n
Thompson, G. C., 55n
Thompson, J. Walter, Advertising Agency, 592n
Thompson, Sanford, 26
Thurston, John B., 166n
Tifflin, Joseph, 535n
"Tight" standard times, 489
Time study: *see* Methods and time study
Time-study sheets, 330, 332–333
Time wages: *see* Day work
Tool orders, 315
Top management: 82–91
  appraisal of, 88–90
  and department surveys, 636, 644
  duties of, 82–85
  failures of, 90–91
  by historical period, 156–157
  planning resposibilities of, 286, 287, 301
  procurement director as member of, 575–576, 578–579
Top management (*cont.*):
  qualifications for, 86–87, 116–118
  selection of, 87–88, 91
  (*See also* Executives)
Tomlin, Stokes, 591n
Tote box, 250, 251
Toynbee, Arnold, 6n
Tractor-trailer systems, 245, 253
Trade, rise of, 5
Trade tests, 396
Trading on the equity, 190
Training: 548–564
  apprentice, 548, 558
  conference method of, 555–556
  costs of, 548, 563–564
  for executives, 138, 548–549, 552–554
  for foremen, 101–102, 549, 551–552, 554–557
  government aids for, 562–563
  induction, 557
  for maintenance work, 270–271
  materials for, 558–561
  and morale, 551
  need for, 548–549, 550–551
  on-the-job, 557–558
  organizational responsibility for, 387, 400–401, 550
  policies for, 549–550
  and promotion chart, 561–562
  salesman, 606–607
  for service-rating, 544–545
  service-rating credit for, 538
  subjects for programs of, 551–552
  Taylor's emphasis on, 27
  vestibule, 557
  for workers, 551, 557–558
Trampling committees, 428
Transfer (of personnel) 401, 534
Transportation, and plant location, 219, 220
Transportation industry, planning in, 290
Transportation inventory, 229
Traveler's Insurance Company, 630
Tree-shaped conference table, 553
Trolley conveyors, 246, 248
Trucks (material handling):
  choice of, 254
  cost of, manual vs power, 255–256
  kinds of, 241–243, 245
Tryon, Richard R., 559n
Twentieth Century Fund, 591

UNDERGROUND PLANTS, 227
Underwood Corporation, 631n
Uniform Partnership Law, 186n
Union contract provisions: 435–442
  arbitration, 437, 439
  company discipline, 422
  discrimination, 436

Union contract provisions (*cont.*):
  general, 442
  grievance procedure, 437, 438
  leaves of absence, 441–442
  lockouts, 442
  price of meals, 420
  production standards, 440
  purpose, 435–436
  recognition, 436
  recognition of rights, 436–437
  representation, 436
  seniority, 439–440
  strikes, 442
  union bulletin boards, 440
  union security, 436
  vacations and holidays, 442
  wage plans, 440
  wage rates, 440, 506, 524, 526–527
  working hours, 440
Unions:
  craft vs industrial, 429, 430
  for foremen, 106–108
  history of, in America, 428–433
  and incentive wages, 501–504
  and plant location, 217
  (*See also* Collective bargaining, Labor)
Unit loads, 243–245
United Auto Workers, 467
United Electrical Workers, 435–436
United Mine Workers, 107, 430, 432
United Paperworkers, 436–437, 442n
U. S. Steel Company, 414n
U. S. Steel Supply, 603
Unity of command, principle of, 65
Universities:
  business research in, 656, 657, 663
  executive training by, 553–554, 563
  management of, 29–30, 137, 147
University of Chicago, 656
University of Cincinnati, 657
University of Pennsylvania, 657
Urwick, Lyndall, 66n, 113n, 115, 128n, 129
Use test, 354–355
Utilities:
  leveling of workload in, 625
  and plant location, 219

VACATIONS:
  as fringe benefits, 472
  and industrial health, 453
  union contract provisions for, 442
Validity measures:
  definition of, 395
  in service rating, 540, 544
Van Ark, Gordon, 552n
Variability, normal curve of, 336–338, 352–353
Variable budget, 207
Variable costs, 49–54
Variation, random, 351–353
Veblen, Thorstein, 86
Vendors:
  credit terms for, 180
  contacts of, with foremen, 578
  and public relations, 677
Vertical chart, 138, 139
Vertical vs horizontal expansion, 32
Vestibule training, 557
Vick Chemical Company, 480
Villers, Raymond, 49n, 198n, 283n
Vision:
  and industrial health, 451–452
  and selection and placement, 399–400
Visual aids for training, 559–561

WAGE-FUND THEORY, 468
Wage-market surveys, 525–527
Wage plans: 483–511
  background of modern, 483–487
  incentive, 487–504; *see also* Incentive-pay plans
  locale of various, 507–508
  random rates, 507–508
  time, 505–508; *see also* Day work
  union contract provisions for, 440
  (*See also* Salaries, Bonuses)
Wage–price relationship, 466–467, 468–470
Wage rates:
  collective bargaining about, 428–431, 440, 506, 524, 526–527
  determinants of, 466–468
  determination of, 515–528
  inequities in, 515
  under piece-work vs standard-time plans, 488
  and plant location, 216–217, 220–221
  organizational responsibility for, 386, 388
Wage stabilization, 471–472
Wage structures, history of, 514–515
Wages:
  administrative problems of, 468–480
  and fact-finding boards, 470
  "fringe," 472–474
  guaranteed annual, 471–472
  and job stabilization, 472
  levels of, 468–470
  and pensions, 478–480
  policies for, 468
  and profit sharing, 474–476
Wagner Act, 99, 106, 107, 436, 554
Walker, Charles R., 33n
"Walking delegates," 428
Walsh-Healy Act, 99, 433
War:
  and material handling, 238
  and plant layout, 227
  and productivity, 33

War (*cont.*):
  and research, 659, 662–663
  (*See also* World War I, II)
Warehousing:
  and marketing, 598, 603
  and material handling, 252
Wassell Corporation, 296n
Waste:
  control of, by foremen, 103–106
  control of, through research, 653
  and incentive-pay plans, 486–487
  and inspection, 344
Waste disposal, and plant location, 222
Water frame, 8
Watertown Arsenal, 26
Watt, James, 8–9
Weaver, E. H., 573n
Webb City, 45n
Wecksler, A. N., 585n
Weighted-check-list rating plan, 541
Welfare fund, 474
Werolin, A. E., 161
Western Electric Company, 265–266, 417
Westinghouse Electric & Mfg. Co., 475n
Weyerhaeuser Timber Co., 420n
Whitmore, Eugene, 449n, 450n
Whitney, Eli, 9–10, 344
Wholesale businesses, planning in, 290
Williams, John H., 206n
Williams, Whiting, 414
Willys-Overland, 500
Wink counter, 333
Women, as personnel problem, 423–424
Work-flow chart, 298
Work orders:
  for maintenance, 269
  for routing, 314, 315, 321
Worker training, 551, 557–558
Worker variability, 336–338
Working capital, 179–181, 191
Working conditions:
  collective bargaining about, 429
  and Industrial Revolution, 11–12
  as personnel service, 416–417
  responsibility for, 386, 388
Working hours:
  bargaining for, 428, 429, 440
  organizational responsibility for, 386, 388
Workloads:
  and methods and time study, 327
  for office work, 625–626
  scheduling of, 320
  (*See also* Peak-and-valley workloads)
World War I:
  collective bargaining in, 432
  foreman training in, 555
  and rise of personnel directors, 390
World War II:
  foreman training in, 562
  and labor budgets, 391
  productivity in, 469
  research in, 662–663
  simulation in, 319
  vacation policies in, 453
  and women in industry, 423
Wright-Patterson Air Force Base, 139n, 355
Wyatt, John, 8
Wyder, Carl G., 276n
Wylie, Harry L., 615n

X RAY, 359

YALE & TOWNE MFG. CO., 243, 603
"Yellow dog" contracts, 433
Yeomanry guilds, 5
Younger, John, 319n

ZALEZNIK, ABRAHAM, 97n
Zenith Radio, 247

658
H688m

BUSINESS
ADM.

AUTOGRAPHED

Management: principles, practi main
658H688m
3 1262 03256 8726

611

UNIVERSITY OF FLORIDA
LIBRARY